SOUTHEAST ISSAQUAH BYPASS

Draft Supplemental Environmental Impact Statement
and Section 4(f) Evaluation

June 2004

Biological Assessment

Chinook Salmon, Coho Salmon,
Bull Trout, Bald Eagle

Washington State
Department of Transportation

U.S. Department of Transportation
Federal Highway Administration

CITY OF
ISSAQUAH

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Southeast Issaquah Bypass

Interstate 90 to Front Street South

Biological Assessment

Chinook Salmon, Coho Salmon, Bull Trout, Bald Eagle

Prepared for:
City of Issaquah
Parsons Brinckerhoff

October 21, 2003

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1.0 INTRODUCTION

1.1 BACKGROUND

The purpose of this Biological Assessment (BA) is to address the effects of the Southeast Issaquah Bypass Project on species listed as threatened or endangered under the Federal Endangered Species Act (ESA) of 1973. This document also addresses the potential effects of the project on Essential Fish Habitat (EFH) as designated under the Magnuson-Stevens Fishery Conservation and Management Act (MSA) of 1996. The Federal Highway Administration (FHWA), in cooperation with the Washington State Department of Transportation (WSDOT) and the City of Issaquah, is preparing a National Environmental Policy Act (NEPA) Supplemental Environmental Impact Statement (SEIS) for a new 1.6-km (1.0-mi) long principal arterial in the City of Issaquah, King County, Washington. The city expects to request FHWA funds to pay for project related costs, which will constitute a federal nexus. In addition, a Section 404 permit from the U.S. Army Corps of Engineers will be required to construct the proposed roadway, which also constitutes a federal nexus. FHWA is the lead federal agency for compliance with NEPA and Section 7 of the ESA; WSDOT is the statewide administrative agency for federally funded transportation projects; and the City of Issaquah is the local lead agency and project proponent. The National Oceanic and Atmospheric Fisheries Division (NOAA Fisheries) formerly known as the National Marine Fisheries Service (NMFS) is responsible for conserving, protecting and managing Pacific salmon and their habitats under the ESA.

The proposed project involves the construction of a new five lane principal arterial roadway along the eastern edge of the City of Issaquah between Interstate-90 (I-90) to the north and Front Street South to the south. Because work will occur within the Issaquah Creek watershed and adjacent to a small tributary to Issaquah Creek (Lewis Lane Tributary), the project has the potential to impact federally listed chinook salmon (*Oncorhynchus tshawytscha*) and bull trout (*Salvelinus confluentus)* and a candidate for federal listing, the coho salmon (*Oncorhynchus kisutch*). Critical habitat for chinook salmon has been designated, however at this time the National Marine Fisheries Service (NOAA Fisheries) is currently reviewing the designation of this and several other listed salmonid species native to the Pacific Coast (NOAA Fisheries 2002a). In addition, the proposed project has the potential to impact federally listed bald eagles (*Haliaeetus leucocephalis*), which are known to nest and winter in the greater Issaquah/Lake Sammamish area.

Parsons Brinckerhoff originally prepared a draft BA for the Southeast Issaquah Bypass Project. Mason, Bruce & Girard, Inc. (MB&G) prepared this final BA for Parsons Brinckerhoff and the City of Issaquah. This BA addresses the proposed action in compliance with Section 7(c) of the ESA, as amended, and Section 305(b)(2) of the MSA, as amended by Public Law 104-267 (See Section 12.0 of this document for EFH Consultation). Section 7 of the ESA assures that, through consultation (or conferencing for proposed species) with the U.S. Fish and Wildlife Service (USFWS) and NOAA Fisheries, federal actions do not jeopardize the continued existence of any threatened, endangered or proposed species, or result in the destruction or adverse modification of designated or proposed critical habitat.

Section 7 consultation and conferencing is accomplished, in part, through this BA, which evaluates the potential effects that the proposed transportation project will have on plant, fish, and wildlife species that are listed or proposed as threatened or endangered under the Federal ESA and their critical habitat. Conservation measures are identified in this BA to avoid or minimize any adverse effects of the proposed project on listed species and their habitat. This document also addresses potential effects to species that are candidates for listing under the ESA, and to federal species of concern, as directed by the WSDOT Environmental Procedures Manual guidelines.

1.2 Location

The project is located along the eastern edge of the City of Issaquah, Washington, approximately 24 km (15 miles) southeast of downtown Seattle. Specifically, the project is located in Sections 27 and 34 of Township 24 North, Range 6 East of the Willamette Meridian (Figure 1).

1.3 Purpose and Need

The purpose of the new roadway is to relieve existing traffic congestion on Front Street South through downtown Issaquah and provide improved mobility throughout the eastern portions of the city. The Southeast Issaquah Bypass project will create a new north/south arterial roadway between I-90 and Front Street South in Issaquah~~, Washington.~~ The proposed project will increase the capacity of the local road network, improve traffic safety, provide an important new link in the regional roadway system, and promote multi-modal transportation options by including pedestrian, bicycle, and recreational trail connections.

This project will reduce existing and future levels of congestion on Front Street South because traffic currently passing through downtown Issaquah could use the Southeast Issaquah Bypass as an alternate route between I-90 and points south of the city. A portion of the trips that now use Southeast Newport Way for access to and from I-90 could be expected to shift to the Southeast Issaquah Bypass. Traffic on East Sunset Way will also be expected to decrease because the new bypass will provide an alternate route between areas north and south of I-90. The new arterial may also result in fewer future trips on other north/south arterials such as Front Street South and 2nd Avenue Southeast.

1.3.1 Project History

For over ten years, WSDOT, King County, and the City of Issaquah have been exploring ways to provide additional access to I-90 in the Issaquah area and create an alternate route for north-south traffic through the congested Front Street corridor. The first such study was the I-90 Issaquah Area Access Study. That study identified the Southeast Issaquah Bypass Road, the Sammamish Plateau Access Road (SPAR), and the I-90 Sunset Interchange modifications as important improvements that could reduce congestion and improve mobility in the Issaquah subarea. The City of Issaquah and King County have included the Southeast Issaquah Bypass corridor in their Comprehensive Plans since 1995. Additional studies have investigated several alternative north-south corridors extending as far east as State Route 18 (SR-18).

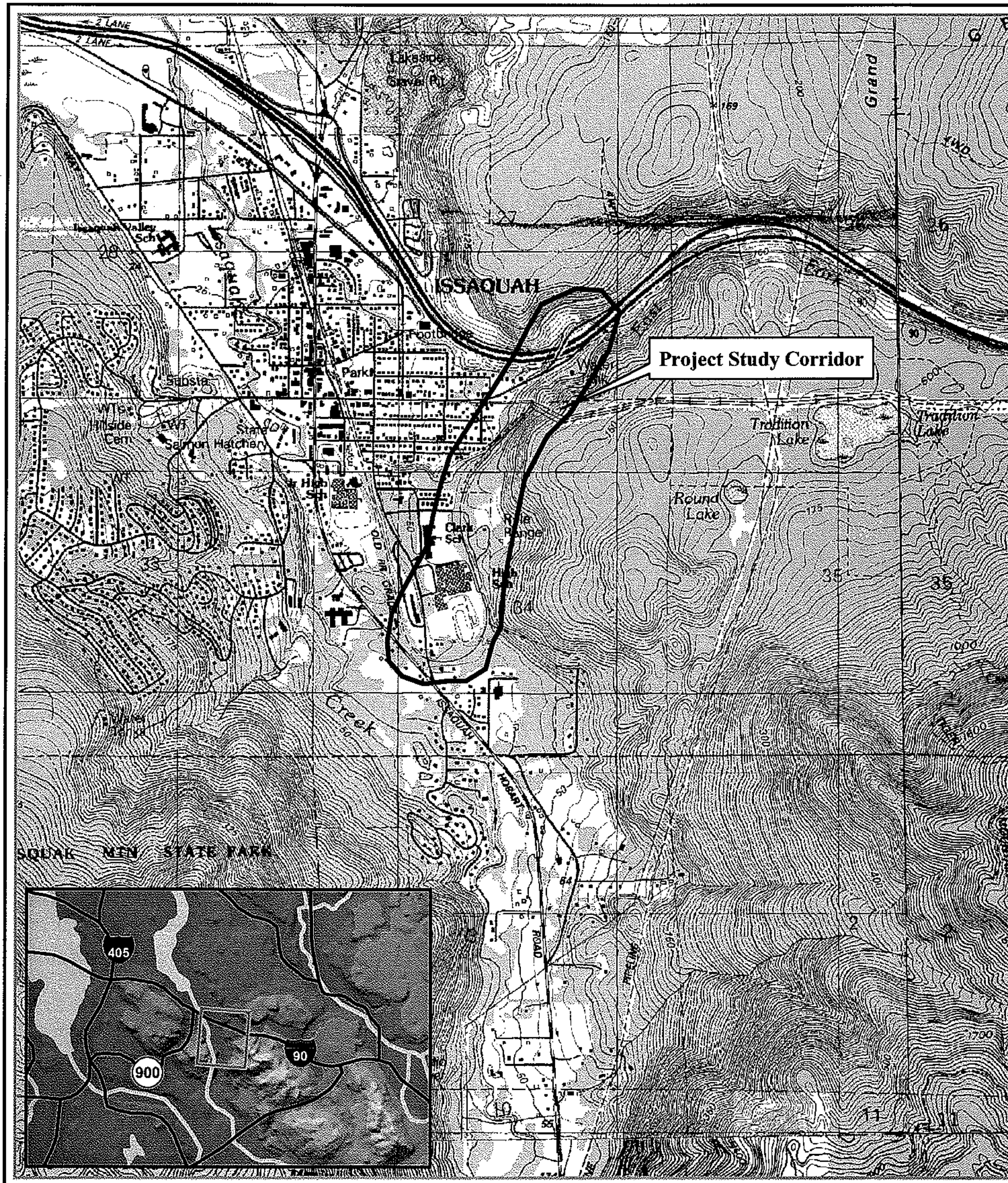

Figure 1.

Project Area and Location Map
SE Issaquah Bypass
King County, Washington

Miles: 0, 0.3, 0.6
Kilometers: 0, 0.25, 0.5, 0.75, 1

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Figure1.pdf Creation Date: July 29, 2003

The proposed Southeast Issaquah Bypass project is the culmination of these earlier studies and represents the optimum corridor within which to alleviate current and future congestion. A number of roadway alignments within this corridor were studied in the Southeast Issaquah Bypass Road Alternatives Alignment Study. Two alignments in the north and five alignments in the south were evaluated in that study. The alignments were evaluated based on preliminary construction and right of way costs, environmental impacts, and transportation benefits.

In spring of 1997, the Issaquah City Council identified the two northern alignments (North A and North B) and two of the five southern alignments (South A and South B) for further analysis in the Draft EIS. Later, a third northern alignment (North C) was added and included in the Draft EIS issued in June 2000.

After reviewing agency and public comments on the Draft EIS, the City decided to eliminate the South B alignment from further study because of its substantial wetland impacts. A new south alignment (South C) was then developed that minimized wetland impacts. The combined effect of a new southern alignment, a change in the design year from 2015 to 2030, and the resulting need for a four-lane roadway from I-90 to Front Street South has required the preparation of a Supplemental Draft EIS (SDEIS). The Preferred Alternative, and the Alternative addressed in this BA (also referred to as Alternative 6), combines the North C Alignment and the South C Alignment (Figure 2).

The proposed project is being reviewed under the Interagency 404 Merger Agreement. As such, several state and federal agencies have been involved during the initial review stages and in preparation of environmental analysis for the project. In cooperation with WSDOT and FHWA, other state and federal agencies reviewing the project include Army Corps of Engineers, NOAA Fisheries USFWS, Environmental Protection Agency (EPA), Washington Department of Ecology (Ecology), and Washington Department of Fish and Wildlife (WDFW).

Under the Merger Agreement, signatory agencies reviewing the project provided concurrence for the proposed project's Purpose and Need (Concurrence Point 1) and Alternatives to be Considered (Concurrence Point 2) following a series of meetings prior to preparation of the Draft EIS in 2000. Upon resumption of project efforts on the SDEIS in 2002, the signatory agencies were asked to revisit Concurrence Point 2 in consideration of the proposed project changes. Prior to release of the Final EIS, Interagency Merger Agreement agencies will be asked to provide concurrence on the final Wetland Mitigation Plan and the least damaging practicable alternative (LEDPA) for the proposed project, as Concurrence Point 3 of the Merger Agreement process. After this concurrence and upon issuance of the Final EIS, FHWA will issue a Record of Decision (ROD).

1.3.2 Consistency with Growth Management Act (GMA)

The proposed project will comply with regulations under the Washington State Growth Management Act (GMA) [RCW 36.70A], which requires that improvements including roads, sidewalks, bicycle lanes and other infrastructure be in place at the time of development, or that financial commitments be made to complete those improvements within six years. The proposed project will support planned development identified within the City of Issaquah Comprehensive Plan, consistent with the GMA regulations.

The transportation element of the City's Comprehensive Plan describes the City's Transportation Improvement Plan (TIP) for 1995-2015 and lists projects intended to address roadway deficiencies in the city. The Southeast Issaquah Bypass project is the first project listed in the "Major Roadway Improvements, Capacity Projects" category in the TIP. The Southeast Issaquah Bypass project is also identified under Policy T-91 of the transportation element, which describes the City's support for the construction of "major capital facilities to support the land use vision" in the Comprehensive Plan.

Chapter 18.15 of the Issaquah Municipal Code implements the City's Transportation Concurrency Management under the GMA. The City's regulations define an acceptable level of service for local roadways based on established volume to planned capacity measures. Presently several local roadways do not meet these standards, therefore additional roadway capacity is required before new development can be constructed. The proposed project will be consistent with the intent of these regulations that roadway capacity be provided to support planned development within the Issaquah Comprehensive Plan.

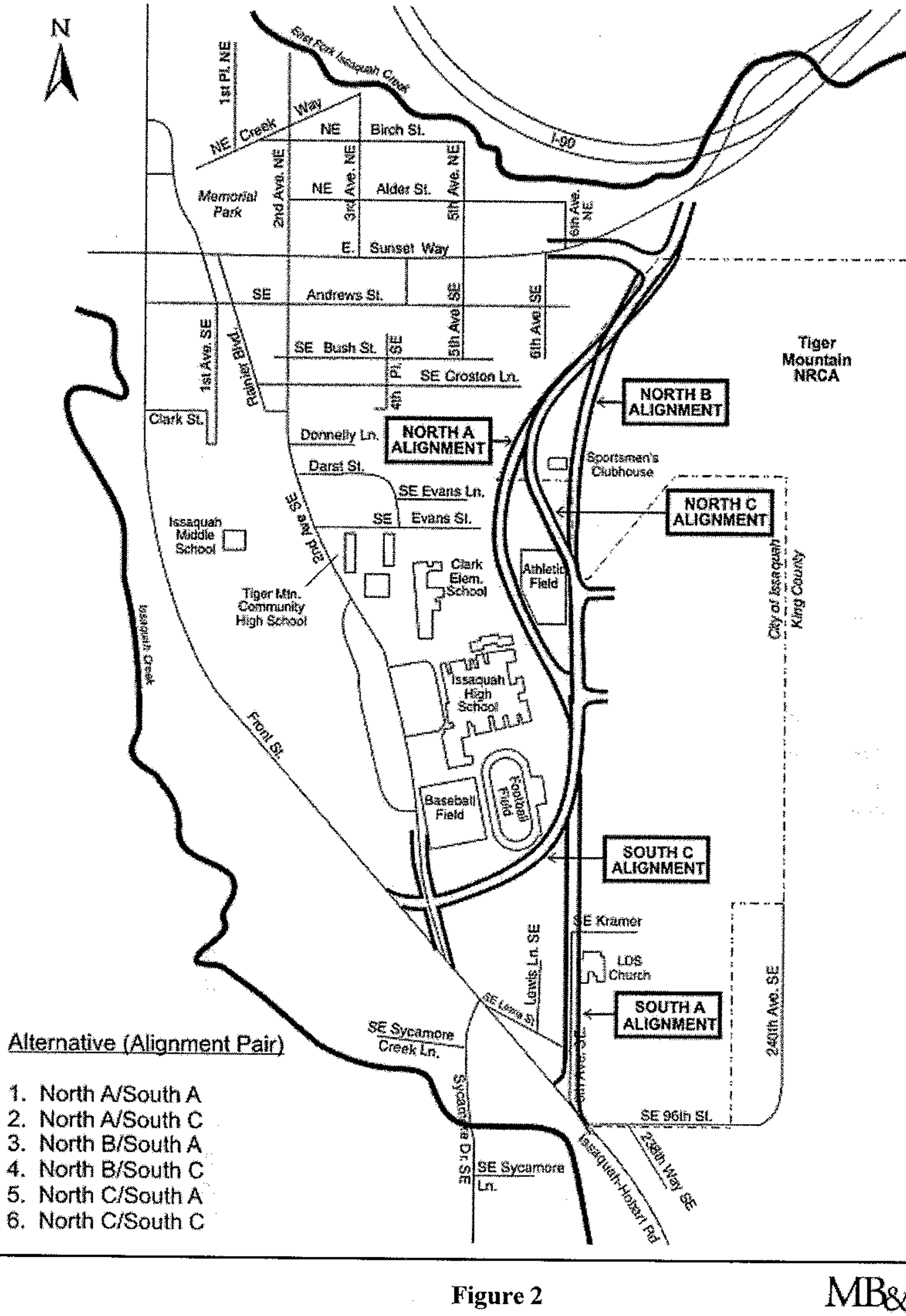
Without new infrastructure improvements, the level of service will be expected to continue to deteriorate in the city. The resulting traffic congestion will, under GMA requirements, prevent new construction until new facilities could be provided or until the City adopted changes to level of service measures to lower acceptable standards for roadway congestion and travel time delays. The City's Comprehensive Plan states that if capacity improvements or other measures cannot be implemented to address level of service deficiencies, a re-designation of the level of service standard may be employed "as a last resort."

1.3.3 Local and Regional Mobility

The Issaquah sub-area's transportation needs are identified and well documented in local and regional comprehensive plans. These documents include lists of projects necessary for satisfying transportation concurrency needs for planned growth and for meeting existing needs. In this way, the projects are related and cumulative in terms of their contribution to concurrency management and capacity. However, they are independently capable of providing capacity to the sub-area road network.

The existing transportation system in the Issaquah sub-area is either failing or at the brink of failure. The existing roadway network is very limited in providing north-south corridors, and even more limited with regard to corridors that also access I-90. Because this area has generally developed with residential land uses, there is a heavy westbound commute in the morning to job opportunities in Seattle, Bellevue, and other west King County destinations and heavy eastbound commute trips in the afternoon.

Because of this commute pattern and the limited number of north-south corridors with access to I-90, the City is currently experiencing a large volume of pass-through traffic in the morning and afternoon peak hours. Pass-through traffic is defined as trips originating and ending outside the City of Issaquah. Most of the pass-through traffic occurs in the north-south direction as vehicles try to access I-90 in the peak hours. It has been found that many vehicles have origination and destination points (AM and PM peak hours, respectively) south of the Issaquah city limits. Due to the limited options available, Front Street South has become significantly congested during peak hours.



Miles
0 0.3 0.6
Kilometers
0 0.25 0.5 0.75 1

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Figure 2

Project Alignment Map
SE Issaquah Bypass
King County, Washington

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Figure5.jpg Creation Date: September 23, 2003

Future traffic forecasts suggest that without other north-south corridor options, Front Street South will continue to become congested and peak-hour conditions will most likely spread for a longer duration. Delay and vehicle queuing may be especially severe near the Front Street South and I-90 intersections. In the morning, extensive queues and delays are predicted southbound from the Sammamish Plateau area, and northbound from south of the Issaquah city limits. In the afternoon, these predicted queues and delays reverse direction.

Given the severe congestion anticipated along Front Street South, drivers will look for alternative routes such as 2nd Avenue Southeast, which will result in an increase in neighborhood cut-through traffic. The Southeast Issaquah Bypass is needed to improve mobility between the northern and southern portions of Issaquah and to provide additional access to I-90.

The Southeast Issaquah Bypass is expected to reduce congestion along Front Street South in the future (as compared to the No Action Alternative). It is also expected to reduce future neighborhood cut-through traffic along 2nd Avenue Southeast. The Southeast Issaquah Bypass and the Sunset Way interchange modifications currently underway are expected to provide some relief to the Front Street/I-90 Interchange. This will be primarily due to increased capacity paralleling Front Street South and the direct connection to I-90 for commuters coming from south of Issaquah. The various local and regional transportation plans show that the benefit and need for the Southeast Issaquah Bypass project will be even greater if other planned arterial street projects and interchange modifications to the north are carried forward. Two other projects (the South SPAR/I-90 Sunset Interchange and the North SPAR project) are currently under construction and have been included in the future-year traffic modeling undertaken for this project. When completed, the Southeast Issaquah Bypass will be one portion of a new north/south major arterial that, with the North SPAR and South SPAR projects, will extend from the Issaquah-Fall City Road on the Sammamish Plateau to the Issaquah-Hobart Road south of Issaquah. The presence of all three projects will complete a north/south system corridor, linking the Sammamish Plateau with the Issaquah Highlands development, I-90, and the region south of Issaquah. This new north/south arterial is needed to provide improved mobility between the northern and southern portions of Issaquah and to support existing and future development. The new project corridor will also relieve congestion within the currently congested Front Street corridor and reduce future neighborhood cut-through traffic. The proposed Southeast Issaquah Bypass project will be one of three critical links in this larger transportation system.

Without the Southeast Issaquah Bypass, significant congestion along Front Street South and a substantial increase in neighborhood cut-through traffic will be observed in the future. The Southeast Issaquah Bypass provides another much-needed north-south corridor that accesses I-90. Future traffic modeling suggests that the Southeast Issaquah Bypass will indeed act as a bypass to Front Street South, therefore alleviating some congestion and reducing traffic volumes along 2nd Avenue Southeast.

1.4 ACTION AREA

The action area for the project is the area where potential impacts to listed species may occur. This area is different for different types of species, depending on their mobility and habitat requirements (Figure 3).

The action area for plant species includes lands within the proposed road alignment right-of-way and an area extending 100 m (328 ft) on either side of the right-of-way.

The action area for terrestrial wildlife species includes lands within the proposed road alignment right-of-way and an area extending 1 km (0.62 mi) on either side of the right-of-way.

The action area for bald eagles includes lands within the proposed road alignment right-of-way and an area extending 1.6 km (1.0 mi) on either side of the proposed road alignment right-of-way.

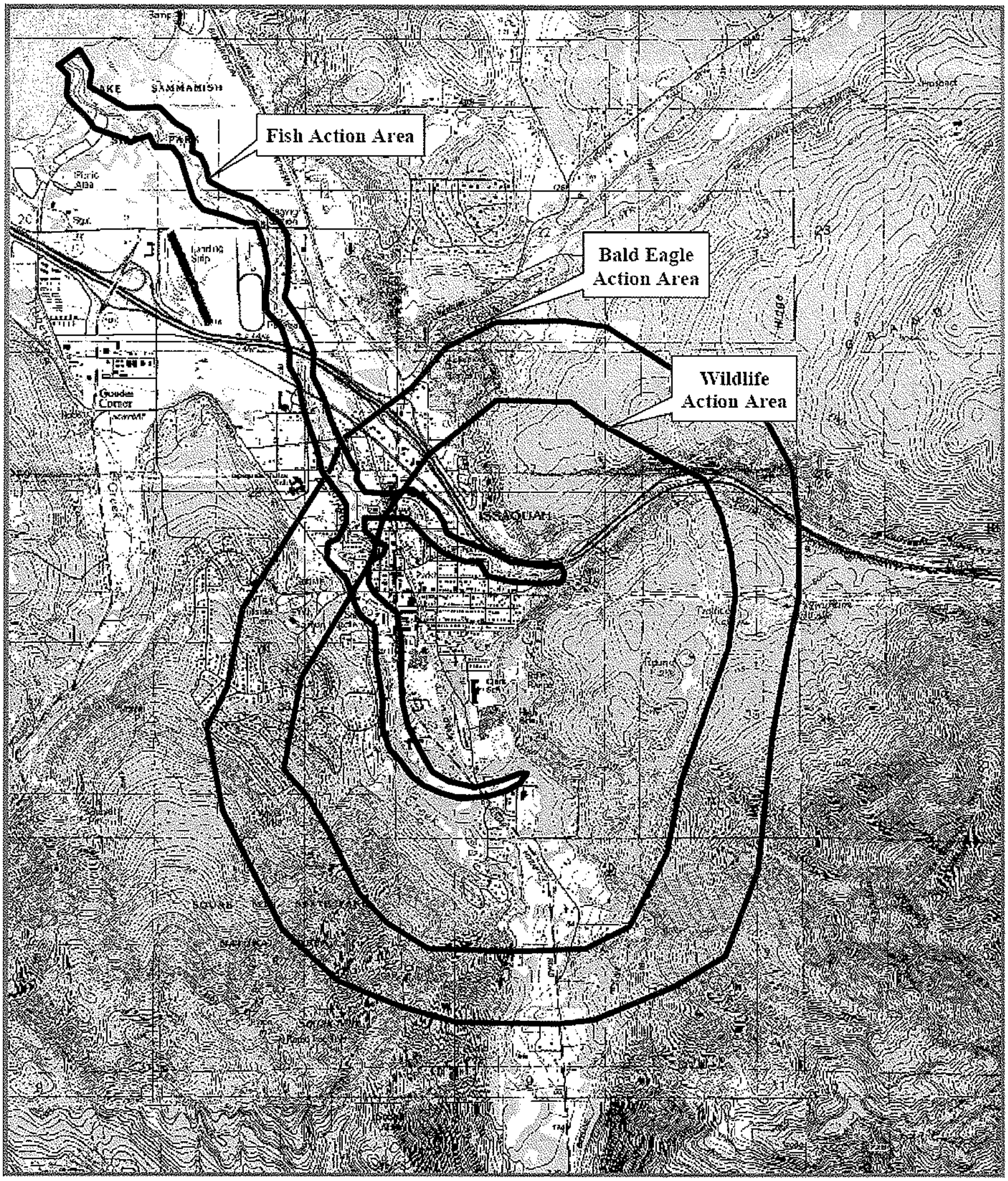
The action area for fish species includes the area of potential impact from project construction or operation. These impacts can be related to direct disturbance from the project (e.g., road construction near or in a stream) or indirect disturbance from changes in water flow regimes, or sediment, stormwater, or other materials delivered to streams by runoff from the project area. The action area includes the middle and lower reaches of the north tributary (also known as the Lewis Lane Tributary) to Issaquah Creek, the East Fork of Issaquah Creek from the East Sunset Way/I-90 Interchange to Issaquah Creek, and Issaquah Creek from its confluence with the north tributary downstream to Lake Sammamish.

2.0 EVALUATION METHODS

USFWS, WDFW, and Washington Natural Heritage Program (WNHP) were contacted regarding the occurrence of federally listed, proposed listed, or candidate species in the project area. NOAA Fisheries formal status reviews on fish populations were reviewed to determine if listed fish species were present in the project area. Three federally listed species and one candidate species were identified by these agencies as potentially being present within or near the project area. Eighteen species of concern were also identified (See Section 14.0).

Herrera and Associates Environmental Consultants performed field surveys within the project area for various fish, wildlife, and plant habitat and species in 1997 and 1998. Stream surveys were completed along the north and south tributaries in the southern end of the project area during fall of 1997 (Herrera and Associates, 1998a). These surveys consisted of stream habitat inventories performed to King County Level 1 standards. Herrera and Associates also contacted several resource agency staff members to help define species presence within the project area. A draft report on stream and shoreline conditions within the City of Issaquah was also used (Parametrix, 2002).

Doug Corkran of MB&G conducted a site visit on November 13 2002 (while employed by Parsons Brinckerhoff). During the site visit, signs of fish or wildlife species presence or use of the project area was noted. Potential habitat for listed species was noted as well.



Miles
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Kilometers
0 0.25 0.5 0.75 1

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Figure 3.

Project Action Area Map
SE Issaquah Bypass
King County, Washington

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Figure4.pdf Creation Date: September 17, 2003

Factors considered in evaluating project impacts include the distribution and population levels of the species, the species' dependence on habitat components that will be removed or modified, the abundance and distribution of habitat, the degree of impact to habitat, and the potential to mitigate the adverse effect. The methods outlined in *Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale* (NOAA Fisheries, 1996) were used to analyze the potential for project impacts on water quality and in-stream and riparian habitat quality. The method of analysis used in this BA is to determine the environmental baseline for the watershed, discuss how the proposed action will affect the environmental baseline, and then use that information to arrive at a determination of effect.

3.0 PROJECT DESCRIPTION

3.1 OVERVIEW

This Biological Assessment has been prepared to analyze the potential impacts of the Preferred Alternative identified in the Supplemental DEIS for the Southeast Issaquah Bypass project. The preferred alternative (Alternative 6) will extend southward for approximately 1.6 km (1.0 mi) from a new T-intersection at East Sunset Way to a new four-way intersection at 2nd Avenue Southeast. The proposed roadway will traverse the western edge of the Tiger Mountain Natural Resource Conservation Area (NRCA) following the base of Tiger Mountain. The alignment will then follow a former railroad right-of-way around the southern end of Issaquah High School to its terminus at 2nd Avenue Southeast.

The new principal arterial will include two travel lanes in each direction, with center-turn and right-turn lanes in several locations (Figure 4). Each travel lane will be 3.6 m (12 ft) wide, and 1.5-m (5-ft) wide bicycle lanes will be provided in each direction adjacent to the curb and gutter. A 4.2-m (14-ft) wide hard-surfaced pedestrian/bicycle trail will also be provided along the entire western edge of the roadway, providing connections to the Rainier Trail and the Tiger Mountain trail system. A new trailhead parking area at the eastern end of Southeast Andrews Street will provide additional access to the Tiger Mountain trail system. A 1.5-m (5-ft) wide sidewalk will be provided along the eastern roadway edge.

Retaining walls as high as 15 m (50 ft) will be constructed along both sides of the roadway along the North A alignment, to minimize impacts to steep slope areas and adjacent properties. Additional walls will be constructed along both sides of the alignment, to minimize impacts to the north tributary to Issaquah Creek, adjacent wetlands, and nearby residential properties.

Five stormwater pond systems will be constructed as part of the proposed project: North Pond 1 located immediately south of East Sunset Way; North Pond 2 located just east of the high school tennis courts; South Ponds C-1 and C-2 located on either side of the southernmost portion of the alignment; and South Pond C-3 in the southwest quadrant of the new four-way intersection at 2nd Avenue Southeast.

3.2 SCHEDULE

Construction will take place over approximately two years. In the first construction season (April-November), the stormwater ponds will be constructed to contain any stormwater runoff from the construction area, most of the southern and middle sections of the site will be cleared and graded, retaining walls will be constructed, the drainage roughed-in, and the sub grade prepared. Clearing and grading of the north section of the site will take place during the first construction season as well; however, work will stop for all sections during the winter season (December-March). Earthwork, retaining walls and subgrade preparation for the north section will be completed during the second construction season. Surfacing, paving, signalization and signing will take place during the winter and spring of the second year.

3.3 SITE CLEARING

Stormwater facilities will be constructed first to treat stormwater from the construction site. Then the remainder of the site will be cleared. Trees will be felled and merchantable timber removed from the site. Some trees may be used to implement mitigation measures such as adding LWD to streams. Smaller vegetation will be bladed and removed. Table 1 shows the various vegetation types to be cleared.

Table 1. Vegetation Clearing by Cover Type

Forest Clearing ha (ac)	Shrub Clearing ha (ac)	Wetland Clearing ha (ac)	Total Cleared Area ha (ac)
3.60 (8.90)	6.50 (15.90)	0.06 (0.16)	10.16 (24.96)

3.4 GRADING AND EARTHWORK

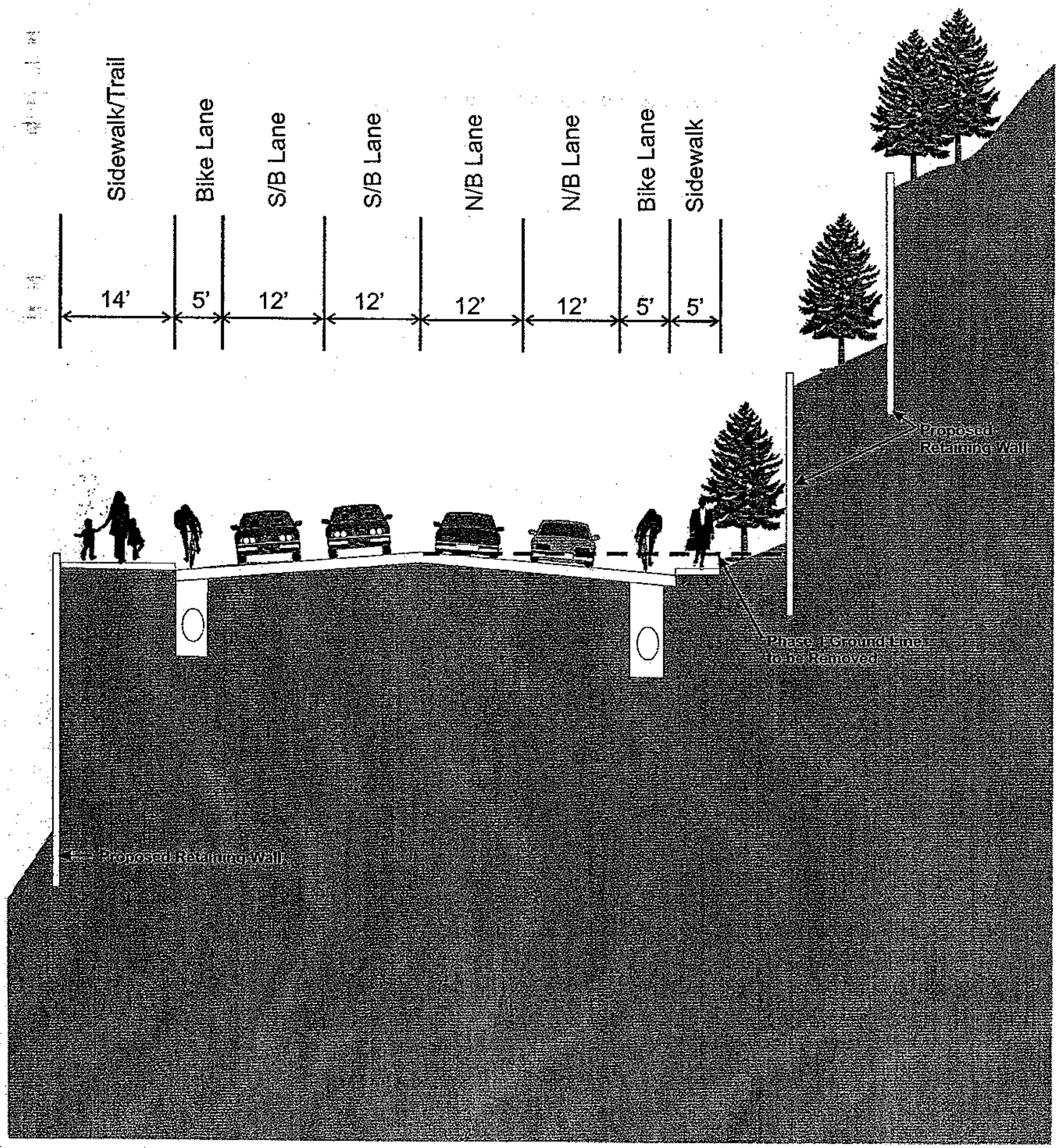
The proposed alignment crosses a steep slope at the north end, a generally flat area in the middle section and a depression on the south side. Generally, the north side will need substantial amounts of cut and the south end will require fill. The total estimated cut volume is approximately 106,466 m^3 (139,252 yd^3), and the total estimated fill volume is approximately 29,890 m^3 (39,095 yd^3).

3.5 STORMWATER SYSTEM DESIGN

Five new stormwater ponds will be constructed in the project area: North Ponds 1 and 2 and South Ponds C-1, C-2, and C-3. All ponds are designed in accordance with King County *Surface Water Design Manual* 1998 edition, Level 2 detention and sensitive lake/large wet pond water quality requirements.

The design and construction of detention and infiltration ponds as a part of this project will mitigate the potential increase in the rate of stormwater runoff from the 7.72 ha (16.06 ac) of impervious area associated with the constructed project.

Figure 4. Typical Roadway Cross Section (Phase 2)



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All stormwater management facilities for the Southeast Issaquah Bypass project will be designed using the guidance and criteria set forth in the 1998 King County Surface Water Design Manual (or a forthcoming update to that manual that will be consistent with the Ecology's Stormwater Management Manual for Western Washington). The entire project site lies within a Sensitive Lake Protection area as defined for water quality treatment.

Table 2 shows the total area within the limits of the Southeast Issaquah Bypass corridor, the estimated ground cover characteristics in those areas under existing conditions, and the approximate areas of new impervious surfaces and other ground cover within the project area.

Table 2. Estimated Project Area and Ground Cover Characteristics

Total Area ha (ac)	Existing Impervious Surface Area ha (ac)	Existing Wetland Area ha (ac)	Existing Forest and Open Space Area ha (ac)	Developed Impervious Surface Area ha (ac)	Developed Open Space Area ha (ac)
11.40 (28.17)	1.22 (3.02)	0.03 (0.08)	10.14 (25.06)	5.28 (13.04)	6.12 (15.13)

Stormwater detention system design will meet Level 2 flow control criteria. Level 2 flow control requires matching predevelopment peak flow rates and flow duration for all storm events ranging from 50 percent of the two-year storm to the 50-year storm (King County, 1998). Consistent with Ecology's requirements for flow control (Ecology, 2001), the predevelopment condition of the site is considered forested (e.g., the natural pre-settlement condition) for the purposes of sizing stormwater detention systems for the proposed roadway. Infiltration pond facilities will be designed to retain as much runoff as possible within the infiltration capabilities of the available sites. The volume generated in tributary drainage areas in the 100-year, 24-hour, storm event in excess of site infiltration capabilities would be discharged to the adjacent natural discharge point.

For roadway areas that would drain to surface waters, the Level 2 flow control criteria and the requirement to match forested flow rates would result in very low peak flow rates of runoff discharged to mainstem Issaquah Creek and East Fork Issaquah Creek. Thus, it is anticipated that the project would not cause flow rates to increase in Issaquah Creek during flood events. Although the project would be required to reduce peak-flow rates in accordance with regulatory criteria, the increased impervious surface area associated with the Southeast Issaquah Bypass roadway under any of the build alternatives would result in greater volumes of runoff discharged to Issaquah Creek via the north tributary. The discussion of surface water hydrologic impacts presented here is therefore focused primarily on the potential effects of increased volumes of runoff entering Issaquah Creek.

When future modifications are made to the 1998 *King County Surface Water Design Manual* and adopted by the City of Issaquah, such changes will be incorporated into the project design as required.

Stormwater runoff associated with the proposed project will be managed in the following manner.

- Runoff from new impervious surfaces from a high point near the Issaquah High School athletic fields northward to the connection with the I-90/East Sunset Way interchange will be purposefully infiltrated to the maximum extent possible. This portion of the proposed Southeast Issaquah Bypass roadway (between curb lines) will drain into three new infiltration ponds. One of these ponds (North Pond 1) will be located at the north end of the project corridor, on the south side of East Sunset Way. The second infiltration pond (North Pond 2) will be located near the high school athletic fields on the west side of the Southeast Issaquah Bypass roadway. The third infiltration pond (South Pond C-1) would be located adjacent to the new south trail parking lot on the east side of the Southeast Issaquah Bypass roadway. Preliminary investigations of infiltration potential at these three pond locations indicate that it should be feasible to reliably infiltrate large amounts of runoff in the native soils.

  Preliminary analyses of infiltration pond performance were conducted for the present EIS study (Herrera, 2003). Based on soil and shallow ground water characteristics observed at the I-90 Sunset Interchange project site and in the proposed Park Pointe development property, the design infiltration rate assumed for preliminary pond sizing and evaluation of North Pond 1 is 5.1 centimeters per hour (2.0 inches per hour). The design infiltration rate assumed for preliminary sizing and evaluation of North Pond 2 and South Pond C-1 is 12.7 centimeters per hour (5.0 inches per hour). Based on all available information, these rates appear to be conservative (i.e., the native soil conditions and ground water elevation may be more conducive to infiltration than assumed). As discussed below, it is expected that these infiltration ponds would be capable of infiltrating nearly all of the runoff directed to them from the project site roadways.

  Additional testing of infiltration rates at proposed pond sites is warranted to confirm that site runoff can be managed in this manner. Runoff would be pretreated prior to infiltration. Overflows from North Pond 1 (which would only be expected in extreme runoff conditions) would be directed to East Fork Issaquah Creek via a new culvert or pipe under East Sunset Way. Overflows from North Pond 2 and South Pond C-1 would be directed southward to the north tributary of Issaquah Creek.

- Off-road runoff in the northern part of the project corridor will sheet flow off of the pedestrian trail and sidewalks, away from the adjacent roadway, and will soak into the ground in the permeable native soils.

- Runoff from the Southeast Issaquah Bypass corridor between the entrance to the new south trail parking lot and the south end of the project corridor (intersection with 2nd Avenue Southeast) would be discharged to surface drainage systems following treatment and peak flow reduction in engineered wet/detention ponds. A combined wet/detention pond (South Pond C-2) will be constructed immediately south of the high school athletic field. Another combined wet/detention pond (South Pond C-3) will be constructed on the southwest side of the new intersection of 2nd Avenue Southeast, Front Street South, and the Southeast Issaquah Bypass. South Pond C-2 will discharge into wetland HS located north of the former railroad right-of-way. A new 900-mm (36-in) diameter culvert will replace the existing (smaller) culvert through the former railroad right-of-way, to convey pond outflows and wetland outflows southward to the north tributary to Issaquah Creek. South Pond C-3 will discharge to the south via an existing storm drain conveyance system that empties into the north tributary on the west side of Front Street South. Off-site flows will be bypassed around Pond C-3.

Table 3 shows the estimated annual surface runoff and infiltration volumes for the proposed project, assuming average precipitation conditions for the project area of 146 cm (57.5 in) of precipitation in a normal year. The "total developed surface discharge volumes" and "total developed infiltration volumes" listed in Table 3 reflect the assumption that Southeast Issaquah Bypass roadway runoff in the south end of the project corridor would be discharged to surface waters, whereas almost all of the roadway runoff north of the entrance to the south trail parking lot would be purposefully infiltrated. Details on the assumptions incorporated in the runoff calculations regarding runoff and infiltration characteristics of various types of ground cover are listed at the bottom of Table 3.

Table 3. Annual Stormwater Runoff and Infiltration Volumes within Project Area

Existing Surface Runoff and Infiltration Volumes are in cubic meters (acre-feet)				
Existing Surface Runoff from Impervious Surfaces	Existing Surface Runoff from Forest and Open Space	Existing Surface Runoff from Wetlands	Total Existing Overland Surface Runoff	Total Existing Infiltration
16,078 (13.0)	14,808 (12.0)	245 (0.2)	**31,131 (25.2)**	**81,445 (66.0)**
Developed Surface Runoff and Infiltration				
Developed Surface Runoff from Impervious	Developed Runoff from Open Space	Developed Infiltration Occurring Naturally	Total Developed Overland Surface Runoff	Total Developed Infiltration Volume
69,328 (56.2)	22,351 (18.1)	49,172 (39.9)	**46,491 (37.7)**	**94,361 (76.5)**
Changes in Surface Runoff and Infiltration				
			Change in Surface Runoff Volume	Change in Infiltration Volume
			15,360 (12.5)	**12,916 (10.5)**

Assumptions:

- 90% of precipitation on impervious surfaces produces runoff in existing and developed conditions
- 50% of precipitation on wetlands produces runoff
- 10% of precipitation on open space and forest areas produces runoff in existing conditions
- 55% of precipitation on open space and forest areas infiltrates in existing and developed conditions
- 25% of precipitation on open space areas produces runoff in developed condition

Example calculations:

- Runoff from impervious (existing or developed, in m^3 = impervious area, in ha * 10,000 m^2.)/ha * 0.9 * 1.46 m annual precipitation.
- Runoff from forest and open space in existing condition (m^3.) = area of forest and open space (ha) * 10,000 m^2/ha * 0.10 * 1.46 m annual precipitation.
- Runoff from open space (i.e., landscaping and grass) in developed condition (m^3) = area of open space (ha) * 10,000 m^2/ha * 0.25 * 1.46 m annual precipitation.
- Runoff from wetlands (m^3) = area of wetlands (ha) * 10,000 m^2/ha * 0.5 * 1.46 m annual precipitation.
- Off-road flow that infiltrates to ground water (m^3) = area of forest and open space (ha) * 10,000 m^2/ha * 0.55 * 1.46 m annual precipitation.

As noted previously, a preliminary evaluation of the feasibility of infiltrating project site runoff was performed for the EIS study (Herrera, 2003). Three of the proposed stormwater management ponds for the Southeast Issaquah Bypass project were assumed to provide infiltration (North Pond 1, North Pond 2, and South Pond C-1), and all of the other stormwater facilities under consideration were assumed to provide no infiltration. The King County Runoff Time Series (KCRTS) program was used to analyze the amount of roadway runoff that could be infiltrated in these three ponds given the limited site area presently proposed for the ponds and using reasonably conservative assumptions for stormwater infiltration rates. The KCRTS program simulates a continuous series of runoff responses based on over 40 years of precipitation records. The results of this preliminary evaluation indicate the following:

North Pond 1 would be capable of infiltrating over 99.7% of the roadway runoff volume routed to it, but would overflow to East Fork Issaquah Creek during approximately a 4-year recurrence interval storm event. That overflow could be avoided if the pond could be made larger, but that may not feasible given space constraints.

North Pond 2 would be capable of infiltrating all of the roadway runoff volume routed to it in the 50-year storm event. There is sufficient space in this pond area to enable sizing of the infiltration pond to avoid any overflows, except in very rare events.

South Pond C-1 would be capable of infiltrating over 99.9% of the roadway and trail parking area runoff routed to it, but would overflow to the north tributary of Issaquah Creek during approximately a 15-year recurrence interval storm event.

Based on this evaluation of expected infiltration pond performance, Table 3 assumes that all of the Southeast Issaquah Bypass roadway runoff north of the entrance to the new south trail parking lot (southeast of the high school) would infiltrate into the ground in engineered stormwater ponds in a typical year, and would recharge groundwater. Refinements to the estimated infiltration pond performance can be made with site-specific infiltration rate testing, but that data had not been gathered as of the time this BA was prepared. Field investigations of shallow ground water levels and soil infiltration capacity are highly recommended prior to final design of the project.

As indicated in Table 3, construction of the project would result in greater volumes of runoff discharged to surface water in the southern portion of the project area and greater volumes of runoff discharged to groundwater in the northern portion of the project area compared to existing conditions. This is because the alteration of forest and open space areas to create new impervious surface cover would reduce evapotranspiration of water that occurs in the natural soil and vegetation community. Impervious surfaces produce runoff under nearly all storm conditions, whereas much of the rainfall on natural areas is absorbed by the vegetation and evaporated back into the atmosphere.

As indicated in Table 3, the project will result in greater volumes of runoff discharged to surface *and* groundwater in the southern portion of the project area compared to existing conditions. This is because the alteration of forest and open space areas to create new impervious surface cover will reduce evapotranspiration of water that occurs in the natural soil and vegetation community. Impervious surfaces produce runoff under nearly all storm conditions, whereas much of the rainfall on natural areas is absorbed by the vegetation and evaporated back into the atmosphere. However, all of the runoff from new impervious surfaces at the south end of the roadway corridor will be controlled to match predevelopment peak flow amounts and duration, while all the runoff from the north end of the project will be infiltrated. The project will cause increases in infiltration and surface discharges over current conditions.

3.6 TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES

Construction of the project could increase the potential for transient releases of sediment and turbid water runoff. Erosion hazard areas have been identified in the northerly part of the project, primarily between I-90 and Southeast Croston Lane.

Temporary erosion and sediment controls (TESC) Best Management Practices (BMPs) will be implemented as recommended in the King County *Surface Water Design Manual* 1998 edition. Newer BMPs outlined in Ecology's *Stormwater Management Manual for Western Washington 2001* edition, will also be implemented to reduce the potential for erosion impacts (Table 4).

The Contractor will also be required to submit an erosion control and spill control plan as a part of the project work (Table 5).

Table 4. Temporary Erosion and Sediment Controls Best Management Practices

BMP	Description
	Source Control BMPs
BMP C101	Preserving Natural Vegetation
BMP C102	Buffer Zones
BMP C103	High Visibility Plastic or Metal Fence
BMP C104	Stake and Wire Fence
BMP C105	Stabilized Construction Entrance
BMP C106	Wheel Wash
BMP C107	Construction Road/Parking Area Stabilization
BMP C120	Temporary and Permanent Seeding
BMP C121	Mulching
BMP C122	Nets and Blankets
BMP C123	Plastic Covering
BMP C124	Sodding
BMP C125	Topsoiling
BMP C126	Polyacrylamide for Soil Erosion Protection
BMP C130	Surface Roughening
BMP C131	Gradient Terraces
BMP C140	Dust Control
BMP C150	Materials on Hand
BMP C151	Concrete Handling
BMP C152	Sawcutting and Surfacing Pollution Prevention
BMP C160	Contractor Erosion and Spill Control Lead
BMP C161	Payment of Erosion Control Work
BMP C162	Scheduling
BMP C180	Small Project Construction Stormwater Pollution Prevention
	Runoff Conveyance and Treatment BMPs
BMP C200	Interceptor Dike and Swale
BMP C201	Grass-Lined Channels
BMP C202	Channel Lining
BMP C203	Water Bars
BMP C204	Pipe Slope Drains
BMP C205	Subsurface Drains
BMP C206	Level Spreader
BMP C207	Check Dams
BMP C208	Triangular Silt Dike (Geotextile-Encased Check Dam)

Table 4 (continued)
Temporary Erosion and Sediment Controls Best Management Practices

BMP C209	Outlet Protection
BMP C220	Storm Drain Inlet Protection
BMP C230	Straw Bale Barrier
BMP C231	Brush Barrier
BMP C232	Gravel Filter Berm
BMP C233	Silt Fence
BMP C234	Vegetated Strip
BMP C235	Straw Wattles
BMP C240	Sediment Trap
BMP C241	Temporary Sediment Pond
BMP C250	Construction Stormwater Chemical Treatment
BMP C251	Construction Stormwater Filtration

Table 5. Elements of an Erosion Control and Spill Control Plan

Element	Description
1	Mark Clearing Limits
2	Establish Construction Access
3	Control Flow Rates
4	Install Sediment Controls
5	Stabilize Soils
6	Protect Slopes
7	Protect Drain Inlets
8	Stabilize Channels And Outlets
9	Control Pollutants
10	Control De-Watering
11	Maintain BMPs
12	Manage the Project

3.7 MONITORING

Issaquah Creek and its tributaries are considered Class A freshwater streams. Stormwater runoff leaving the project site will be monitored to assure that the turbidity measurements do not exceed 5 NTU above background when the background turbidity is 50 NTU or less, or have more than a 10 percent increase when the background turbidity is more than 50 NTU, in accordance with WAC 173-201A. In the event that the above background levels are exceeded, work will be stopped and additional controls implemented to bring the runoff from the project site back into compliance with WAC 173-201A.

3.8 SITE RESTORATION

A Site Restoration Plan will be prepared for the proposed project. The plan is intended to mitigate temporary vegetation and ground disturbance impacts associated with construction of the proposed project. The plan includes grading and planting activities that will improve the riparian area of the north tributary to Issaquah Creek within the immediate vicinity of the proposed project.

3.9 MITIGATION AREAS

Mitigation of impacts to wetlands, wetland buffers and salmonid habitat will be accomplished by enlarging an existing wetland, enhancing riparian buffer areas and improving salmonid habitat. See Section 11.0 for a more detailed description of conservation and mitigation measures.

4.0 NATURAL HISTORY AND SPECIES OCCURRENCE

4.1 FISH SPECIES

NOAA Fisheries reports that the project is within the range of the Puget Sound chinook salmon, which is listed as threatened, and the Puget Sound coho salmon, which is a candidate for listing.

USFWS reports that the project is within the range of the bull trout, listed as threatened.

Issaquah Creek and some of its tributaries currently support anadromous runs of native fall chinook salmon, coho salmon, sockeye salmon and kokanee (*Oncorhynchus nerka*), winter steelhead (*Oncorhynchus mykiss*), and cutthroat trout (*Oncorhynchus clarki*) (Parametrix, 2002). Bull trout may be present in some headwater areas of the Issaquah Creek watershed. Other native species within the Issaquah Creek watershed include western brook lamprey (*Lampetra richardsonii*), river lamprey (*Lampetra ayresi*), mountain whitefish (*Prosopium willamsonii*), largescale sucker (*Catostomus macrocheilus*), peamouth chub (*Mylocheilus caurinus*) and various species of sculpin (*Cottus* spp.), although these species are generally limited to areas downstream of the Issaquah fish hatchery weir (Parametrix, 2002). Non-native species are generally associated with Lake Sammamish and the lower two miles of Issaquah Creek and included largemouth bass (*Micropterus salmoides*), smallmouth bass (*Micropterus dolomieu*), black crappie (*Pomoxis nigromaculatus*) and pumpkinseed sunfish (*Lepomis gibbosus*) (Parametrix, 2002).

The Issaquah fish hatchery weir at river kilometer 4.8 (river mile 3.0) stops all upstream migrating fish species except during higher flows when some fish jump the weir (Parametrix, 2002). Generally all fish are directed to the hatchery sorting ponds, where those not used for hatchery purposes (coho and chinook are the only species retained) are passed above the weir to continue their migration. The intake diversion dam upstream of the hatchery at river kilometer 5.6 (river mile 3.5) has a fishway bypass that functions poorly, especially during low flow periods (Parametrix, 2002). This is at times a partial or complete barrier for many species, particularly kokanee.

4.1.1 Chinook Salmon

Species:	Chinook Salmon (*Oncorhynchus tshawytscha*)
ESU:	Puget Sound
Federal Status:	Listed Threatened
Critical Habitat:	In Review

The proposed project area is located within the Evolutionarily Significant Unit (ESU) of the Puget Sound chinook salmon, which was federally listed as threatened on March 24 1999 (64 FR 14308-14328). Critical habitat for the Puget Sound chinook salmon ESU was originally designated to include all marine, estuarine, and river reaches accessible to chinook salmon in Puget Sound. However, on April 30 2002, the U.S. District Court for the District of Columbia approved a NOAA Fisheries consent decree withdrawing critical habitat designations for 19 salmon and steelhead populations on the West Coast, including the Puget Sound chinook salmon (in response to litigation challenging the process by which NOAA Fisheries establishes critical habitat). NOAA Fisheries is currently re-assessing the ESU's listing status and critical habitat designation. As of the date of this document, critical habitat for the Puget Sound chinook salmon has not been designated.

4.1.1.1 Habitat Requirements and Ecology

The Puget Sound chinook salmon exist in the streams and rivers surrounding Puget Sound. These fish exhibit an "ocean-type" life history, meaning that the juveniles migrate to the ocean or estuaries shortly after emerging from the gravel, as opposed to "stream-type" chinook which may spend a year or more in the freshwater streams they were born in before migrating (Myers et al, 1998).

Spawning chinook salmon require areas of clean gravel with good subsurface flow. If subsurface flow is adequate, chinook salmon will spawn in areas with a wide variety of stream depths, flows, and gravel sizes (Healey, 1998). Preferred spawning habitat is often at pool tailouts or medium riffles with 1 to 3 ft of fast-flowing water, probably since these areas often have good subsurface flows. Juvenile chinook salmon typically require structurally diverse habitat, including deep pools, undercut banks, rocks, large woody debris, and good vegetative cover on stream banks. For additional information regarding the habitat requirements and life history of the Puget Sound Chinook Salmon ESU see the Federal Register published March 24 1999 (64 FR 14308)

4.1.1.2 Presence in Project Area

Within the proposed project action area, Puget Sound chinook salmon could be encountered in Issaquah Creek, the East Fork of Issaquah Creek, Lake Sammamish, and possibly in the small tributary to Issaquah Creek adjacent to the south edge of the project (known as the north tributary or Lewis Lane Tributary). Issaquah Creek near the project area has a run of hatchery chinook that may also be present in the smaller tributaries. Within the project area, the north tributary has no spawning areas and marginal rearing habitat (Herrera and Associates, 1998a). A culvert under Issaquah-Hobart Road and a dam created just above it by a homeowner may block fish passage to the stream reaches within the project area. Chinook salmon (especially juveniles) may occupy the lowest reach of the north tributary just upstream of its confluence with Issaquah Creek, but are unlikely to exist upstream, due to unsuitable habitat.

4.1.2 Coho Salmon

Species:	Coho Salmon (*Oncorhynchus kisutch*)
ESU:	Puget Sound
Federal Status:	Candidate for Listing
Critical Habitat:	Not Designated

The proposed project area is located within the ESU of the Puget Sound coho salmon, which is a candidate for federal listing as a threatened or endangered species (NOAA Fisheries, 2002b). Critical habitat for Puget Sound coho salmon has not been designated.

4.1.2.1 Habitat Requirements and Ecology

Coho salmon have one of the shortest life cycles of all anadromous salmonids. Juveniles, often forming large schools, rear in freshwater for 1 year, then migrate to the ocean. Juvenile coho typically require very structurally diverse habitat, including deep pools, undercut banks, large woody debris, brushy stream banks (Weitkamp et al, 1995). Off-channel habitats and small tributary streams act as refuges from high winter flood flows and are important winter habitat for coho. Coho salmon return from the ocean to spawn from early fall to late spring.

Coho salmon spend five to 20 months in the ocean, then return to their natal streams to spawn. Spawning typically occurs in small streams with well-oxygenated areas of small- to medium-sized gravels with some fine sediment deposition. Spawning may also occur along the edges of larger streams and rivers, where flows are slower and shallower. Coho may spawn in areas of higher sediment deposition than other anadromous salmonids (Johnson et al, 1991). For additional information regarding the habitat requirements and life history of the Puget Sound Coho Salmon ESU see the NOAA Fisheries status report by Weitkamp et al (1995).

4.1.2.2 Presence in Project Area

Issaquah Creek near the project area has a strong run of hatchery coho, which may also be present in the smaller tributaries. Within the project area, the north tributary has no spawning areas and marginal rearing habitat (Herrera and Associates, 1998a). A culvert under Issaquah-Hobart Road and a dam created just above it by a homeowner may block fish passage to the stream reaches within the project area. Coho are present in Issaquah Creek tributaries nearby, including the south tributary (King County, 2002), therefore it is likely that coho use the lowest reaches of the north tributary below the passage barrier for rearing habitat or refugia from high flows in Issaquah Creek.

4.1.3 Bull Trout

Species:	Bull Trout (*Salvelinus confluentus*)
DPS:	Puget Sound
Federal Status:	Listed Threatened
Critical Habitat:	Not Designated

The proposed project area is located within Coastal-Puget Sound Distinct Population Segment (DPS) of bull trout. The Coastal-Puget Sound bull trout DPS encompasses all Pacific coast drainages within the coterminous United States north of the Columbia River in Washington. This population segment is discrete because the Pacific Ocean and the crest of the Cascade Mountain Range geographically segregate it from other subpopulations. The population segment is significant to the species as a whole because it is thought to contain the only anadromous forms of bull trout in the coterminous United States, thus, occurring in a unique (i.e., marine) ecological setting (64 FR 58909 58933). No critical habitat has been designated for the bull trout (64 FR 58909 58933).

4.1.3.1 Habitat Requirements and Ecology

Bull trout were once widely distributed throughout the Pacific Northwest, but they have been reduced to approximately 44 percent of their historical range (ICBEMP, 1997). Bull trout have more specific habitat requirements in comparison to most salmon and trout species and are most often associated with clear and cold headwater streams and rivers with undisturbed habitat and diverse cover and structure (64 FR 58909 58933).

Bull trout spawning and rearing is restricted to relatively pristine cold streams, often within the headwater reaches (Rieman and McIntyre, 1993). Although adults can reside in lakes or reservoirs and in coastal areas, they can migrate to saltwater (63 FR 31647). Bull trout distribution is often patchy within watersheds, most likely due to the need for cold water (63 FR 31648). Juveniles are usually located in shallow backwater or side channel areas, and older individuals are often found in deeper water pools sheltered by large organic debris, vegetation, or undercut banks (63 FR 31647). Water temperature is a critical factor for bull trout and areas where water temperature exceeds 15°C (59°F) are thought to limit distribution (Rieman and McIntyre, 1993).

Key factors in the decline of bull trout populations include harvest by anglers, impacts to watershed biological integrity, and the isolation and fragmentation of populations. Changes in sediment delivery (particularly to spawning areas), aggradation and scouring, high water temperatures, reductions in water quality and changes in flow regimes adversely affect bull trout. Bull trout appear to be negatively affected by non-native species such as brook trout through competition and hybridization (offspring of bull trout and brook trout are sterile) (USFWS, 1998). For additional information regarding the habitat requirements and life history of the Puget Sound Bull Trout DPS see the Federal Register published November 1 1999 (64 FR 58909 58933).

4.1.3.2 Presence in Project Area

Spawning populations of bull trout are not documented in Issaquah Creek or other nearby streams or lakes. The only documented occurrences of bull trout in the entire Lake Washington drainage was one caught by an angler in Lake Washington in 1981 and two fish observed holding below a culvert in the headwaters of Issaquah Creek in 1993 (WDFW, 1997). WDFW speculates that these isolated occurrences could be anadromous fish that strayed into the Lake Washington system through the Ballard Locks from other coastal stocks (WDFW, 1997). If spawning bull trout are present, they will be likely limited to cold, clear headwater streams (Parametrix, 2002). Based on the isolated bull trout observations, in spite of the apparent lack of suitable habitat within the lower reaches of Issaquah Creek and it tributaries, it should be assumed that bull trout are present at some times within the Issaquah Creek watershed and the action area.

4.2 WILDLIFE SPECIES

The areas immediately surrounding the proposed project site have a high diversity of wildlife habitat, ranging from open water habitat of Lake Sammamish to the steep forested mountain slopes of Tiger and Squak Mountains. Intensive development in the Issaquah Valley bottom has substantially altered wildlife habitat within and to the west of the project area, although some smaller areas of high quality wildlife habitat such as forested wetlands still exists. The Tiger Mountain NRCA that sits immediately adjacent to the east of the project area offers high quality, relatively intact wildlife habitat.

4.2.1 Bald Eagle

Species:	Bald Eagle (*Haliaeetus leucocephalus*)
Federal Status:	Listed Threatened
State Status:	Listed Threatened
Critical Habitat:	Not Designated

The proposed project may occur within the territory of the bald eagle, which is listed as a threatened species under the ESA. It was federally listed as endangered in 1967, but down-listed to threatened in 1994. It is currently under consideration for de-listing (64 FR 36454-36464). There is no designated critical habitat for the bald eagle.

4.2.1.1 Habitat Requirements and Ecology

Bald eagles in Washington are generally migratory. Eagles that nest in Washington usually move north after nesting to feed on salmon runs in western British Columbia and southeast Alaska. Many of the eagles that winter along rivers or lakes in Washington are birds that nest in Alaska, British Columbia, or Montana (Stinson et al, 2001). The state population was estimated to include 664 occupied nesting territories as of 1998 versus 105 in 1980 and a total winter population of approximately 4,500 as of 2000 (Stinson et al, 2001).

Habitat loss is recognized as the most significant long-term threat to bald eagle populations. Human disturbance is also recognized as a threat to bald eagles. Bald eagle susceptibility to human disturbance varies depending on a number of parameters, including age, individual eagle, vegetation screening, distance, disturbance type, and habituation to activity. Flushing distances in response to visual disturbances may range up to 305 m (1,000 ft) (Stalmaster and Newman, 1978).

Bald eagle nesting parameters in the Pacific Northwest include proximity to water with an adequate food source, large trees with sturdy branching at sufficient height for nesting, and stand heterogeneity both vertically and horizontally (Grubb, 1976). Nest tree structure is more important than tree species and nest trees are typically among the largest in the stand providing an unobstructed view of an associated water body. Critical nesting activities generally occur between early January and late August.

Wintering bald eagles concentrate in areas where food is abundant and disturbance is minimal (Rodrick and Milner, 1991). Because eagles often depend on dead or weakened prey, spawned salmon are an important food source for wintering eagles. Rivers, streams, and large lakes with spawning salmon and/or waterfowl concentrations are primary feeding areas for wintering bald eagles. Eagles typically perch near their food source during the day and prefer the tallest trees, which afford the best views. Deciduous and dead coniferous trees near the feeding area are preferred for diurnal bald eagle perching (Stalmaster and Newman, 1979). Evening roosts are generally established near the feeding area but may occur inland as well (Peterson, 1986). Wintering activities generally occur between mid-November and mid-March.

4.2.1.2 Presence in Project Area

Bald eagles are known to winter within 1.6 to 3.2 km (1 to 2 mi) of the project area from about October 31 through March 31. No bald eagle nest sites were identified within 1.6 km (1.0 mi) of the project area (Negri, 1998). Bald eagle use of the area is centralized near Round Lake and Tradition

Lake, which provide hunting grounds for wintering bald eagles (Jennings, 1998). These lakes are located to the east of the Southeast Issaquah Bypass corridor, in the West Tiger Mountain/Tradition Plateau Natural Resource Conservation Area approximately 1.2 to 1.6 km (0.75 to 1 mi) from the project area. Bald eagles also use the adjacent Issaquah Creek riparian area in conjunction with Round Lake and Tradition Lake (Negri, 1998).

No suitable roosting or perching trees (large trees with open canopy and large branches) were observed along the north tributary or Issaquah Creek at its confluence with the north tributary during a site reconnaissance in November 2002. The north tributary and the nearby reach of Issaquah Creek are densely vegetated, and few perch sites with views of the water body or unobstructed flight paths are available.

Vegetation surveys completed in July and October 1997 (Herrera, 1998b), and a site visit in November 2002, identified some large trees in the upland forest along the eastern boundary of the project site that could provide resting or winter roosting sites for bald eagles. However, this area of forest does not provide high-quality resting sites because there are no large water bodies within view. In addition, a shooting range located in the northern portion of the project corridor likely generates too much noise for bald eagles to tolerate (Stalmaster and Newman, 1979). The Washington Department of Fish and Wildlife does not identify the project site as containing important bald eagle habitat (Negri, 1998). However, incidental use of the project area by bald eagles is possible.

5.0 PROJECT SETTING

5.1 Local Geography

The City of Issaquah is located in a narrow north-south trending valley surrounded on either side by steep forested hills. The West Tiger Mountain Natural Resource Conservation Area (NRCA) is located 3.5 km (2.2 mi) southeast of the southern end of the project area and Tiger Mountain rises to an elevation of approximately 838 m (2,750 ft). Squak Mountain is located 3.8 km (2.4 mi) southwest of the project areas southern terminus with an approximate elevation of 610 m (2,000 ft). Grand Ridge and the Sammamish Plateau are located north of the project area with an approximate elevation of 175 m (550 ft). As shown in Figure 1, the northern part of the project area crosses moderately to steeply sloping forested areas and the southern portion crosses nearly level areas. Gently to moderately sloping hillsides are present near the abandoned railroad right-of-way and the Issaquah High School areas. A steeply sloping hillside is generally located between the Issaquah Sportsmen's Club and the East Sunset Way/I-90 Interchange.

5.2 Geology and Soils

Preglacial volcanism and sedimentation, and glacial, interglacial, and postglacial events in the Puget Sound area shaped the geology and landforms in the proposed project. Bedrock, consisting of volcanic andesite, underlies the entire project area. Glacial, interglacial, and postglacial sediments overlie the bedrock. The glacial and interglacial soils consist of sand, gravel, cobbles, boulders, and silt. Soil units identified in the proposed project area include Alderwood and Kitsap, Briscot Silt Loam, Everett Gravelly Sandy Loam, Oridia Silt Loam, and Pilchuck Loamy Fine Sand (Figure 5). Organic silt, thin layers of peat, and sand mantles the Issaquah Creek valley near the south end of the project.

5.3 HYDROLOGIC SYSTEMS

The proposed project corridor lies within the drainage basin of Issaquah Creek (Figure 6). Runoff from the southern half of the project corridor flows into Issaquah Creek via an unnamed tributary (identified as the north tributaries) and constructed storm drainage systems. Forested scrub/shrub wetland areas exist along and to the south of the project corridor. Existing drainage patterns closely relate to the interconnection of wetlands and the constructed drainage systems. Runoff from most of the northern half of the corridor flows indirectly into the East Fork of Issaquah Creek via storm drainage systems in residential areas. Proposed improvements in the northern project corridor at the East Sunset Way/I-90 Interchange are in the East Fork of the Issaquah Creek drainage basin.

5.3.1 Existing Groundwater Conditions

The project alignment is located on the eastern edge of the lower Issaquah Valley. The lower Issaquah Valley aquifer underlying this area supplies water to most of the population in the city of Issaquah and several developments on the East Lake Sammamish Plateau to the north. The I-90/East Sunset Way interchange at the north end of the project site lies to the east of the lower Issaquah Valley, but groundwater recharge occurring in this interchange area contributes flows to the lower Issaquah Valley aquifer (Golder, 1993).

5.3.1.1 Aquifer Systems

Glacial deposits from the last glaciation (the Vashon glaciation period) define the hydrogeology of the lower Issaquah Valley and adjacent upland areas. Most of the aquifers in the Issaquah Creek valley and beneath surrounding uplands are associated with glacial outwash deposits, which consist primarily of recessional outwash and deltaic deposits. In addition, glacial advance outwash has been tentatively identified in borings in the East Fork Issaquah Creek valley, and the deposits appear to be saturated (GeoEngineers, 1992). Locally occurring aquifers are also associated with recent alluvial deposits and bedrock.

The lower Issaquah Valley aquifer occupies unconsolidated sediments originating from recent alluvial deposits, recessional outwash, deltaic deposits, lacustrine deposits, and older pre-Vashon deposits. The aquifer, which is characterized by permeable zones of sand and gravel stratified with lower-permeability zones, extends approximately 180 m (600 ft) below the valley floor. The deltaic deposits are highly permeable and are the most important source of groundwater within the aquifer (Golder, 1993). Recessional outwash is also highly permeable, and shallow alluvial deposits vary in permeability and may not be fully saturated. The other geologic layers within the aquifer are less permeable and may provide local aquitards (layers of low permeability that store groundwater, but delay its flow).

Perched groundwater creates smaller aquifers near the base of the hillslope along the east edge of the project site. The preliminary environmental investigations for the proposed Park Pointe development (sited adjacent to the central portion of the Southeast Issaquah Bypass corridor) describe two shallow, perched aquifers in detail. These small aquifers are underlain by low permeability soils and bedrock. Seepage from these aquifers occurs in small springs that drain to wetlands in the project area (HDR, 2002).

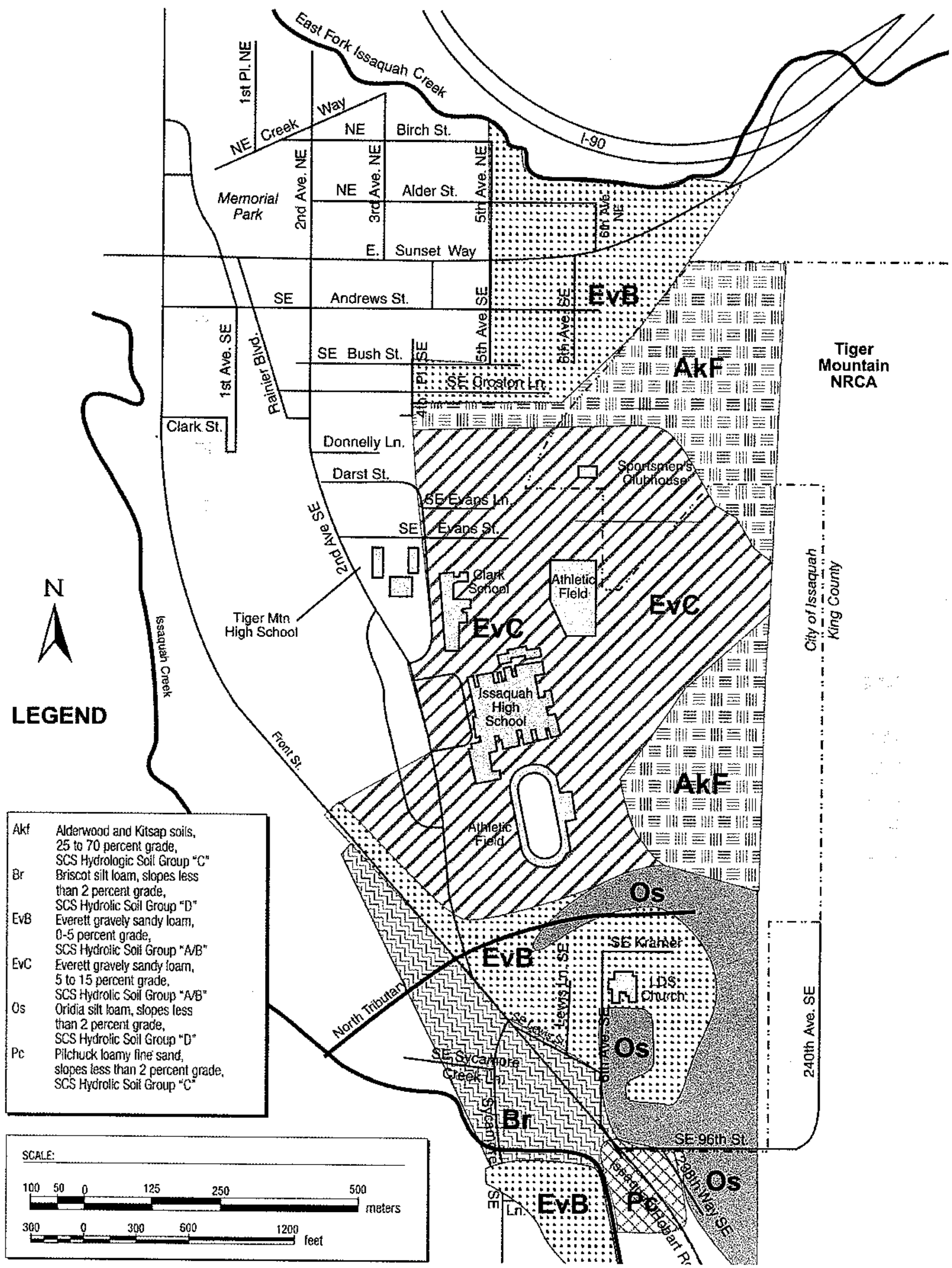
5.3.1.2 Water Wells

Well water monitoring and well tests conducted for various studies of the aquifer system provide information on water levels and the capacity of the aquifer. Static water levels range between elevations of 7.5 and 21 m (25 and 70 ft) (mean sea level) in wells completed in the central valley area at a wide range of depths, and a few of these are artesian wells. The Sammamish Plateau Water and Sewer District operates a Class A water supply system and uses the lower Issaquah Valley aquifer as its main water source, with production wells north of I-90 near the Front Street/I-90 interchange. The City of Issaquah also operates a Class A water system that uses the lower Issaquah Valley aquifer as its sole source of water.

5.3.1.3 Regional Groundwater Recharge, Discharge, and Movement

The recharge area for the lower Issaquah Valley aquifer is extensive, covering much of the lower Issaquah Creek valley and uplands on the Lake Tradition plateau and the Issaquah Highlands to the east. Most of the Southeast Issaquah Bypass project site lies within the mapped recharge area for the aquifer (Golder, 1993). Only the southern end of the Southeast Issaquah Bypass corridor lies outside the aquifer recharge area mapped for the local wellhead protection plan. In general, the available soil mapping combined with the findings of subsurface explorations conducted for the Southeast Issaquah Bypass and Park Pointe projects supports the understanding that most of the undeveloped areas within the project limits provide recharge for the lower Issaquah Valley aquifer. Thus, there is hydrologic connectivity between surface water within the Southeast Issaquah Bypass project site, underlying ground water, and Lake Sammamish further to the northwest of the site.

In recent years, a trend of declining lower Issaquah Valley aquifer levels has been observed. Static water level measurements in City of Issaquah wells from 1981 through 1994 indicate that a gradual 1-m (3-ft) average decline in water table elevation occurred in the lower Issaquah Valley aquifer over that period. The continuing decrease in water levels has caused concern among local groundwater users and suppliers. The declining aquifer levels may indicate that the aquifer is being dewatered by increased well withdrawals, loss of recharge due to increased impervious surface coverage in nearby urban areas, and/or climatic change.



Miles
0 0.3 0.6
Kilometers
0 0.25 0.5 0.75 1

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Figure 5

Surficial Soils Map
SE Issaquah Bypass
King County, Washington

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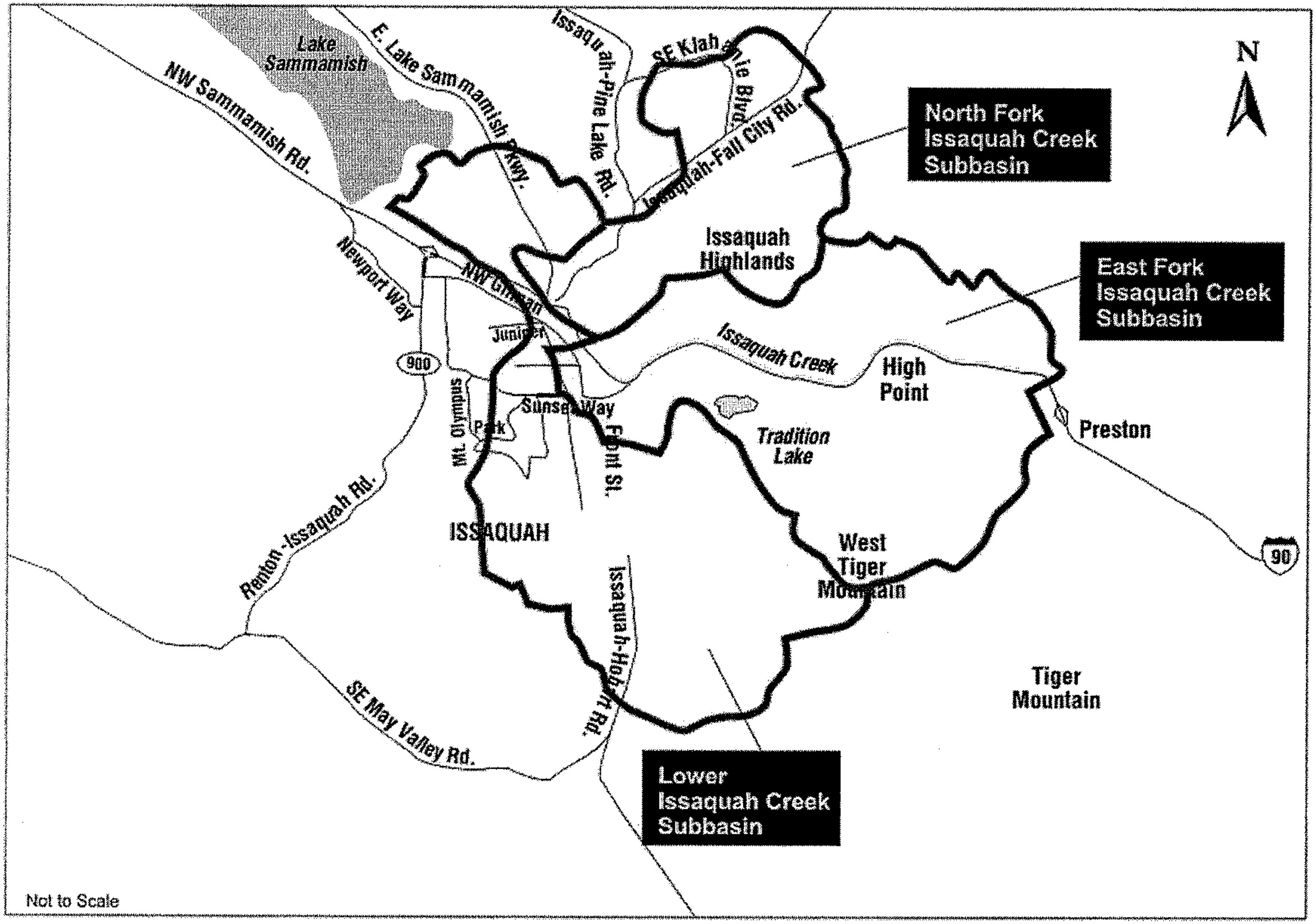

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Figure 6

Subbasin Boundaries Map
SE Issaquah Bypass
King County, Washington

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Figure4.jpg Creation Date: July 29, 2003

Groundwater movement occurs horizontally and vertically and is measured by hydraulic gradients occurring between wells completed in the same aquifer. Within the project area, recharge to shallow groundwater primarily occurs from direct precipitation and infiltration of runoff. The direction of shallow groundwater flow is likely controlled by the topography of the land and by underlying low-permeability strata. Within the immediate project area, shallow groundwater flows in various directions as it moves deeper to the regional aquifer in some locations, and as it emerges as seeps in other locations. Deeper groundwater beneath the Southeast Issaquah Bypass corridor generally flows northwest toward Lake Sammamish and the municipal production wells near I-90 (Golder, 1993; Seattle-King County Health Department and Issaquah Creek Valley Ground Water Action Committee, 1996).

5.3.2 Existing Surface Water Conditions

The proposed Southeast Issaquah Bypass corridor lies within the drainage basin of Issaquah Creek (Figure 7). Runoff from the southern half of the corridor flows into Issaquah Creek via the north tributary and constructed storm drainage systems. Forested and scrub/shrub wetland areas are prevalent along the south end of the project corridor and extend to the south. Existing drainage patterns in this area relate closely to the interconnection of wetlands and the associated outflow drainage systems that have been constructed. The limited runoff that occurs in the northern half of the corridor flows indirectly into East Fork Issaquah Creek via storm drainage systems in the residential neighborhood to the west of the project site.

The north tributary to Issaquah Creek flows along the south end of the Southeast Issaquah Bypass corridor. In addition, East Fork Issaquah Creek flows close to I-90 and East Sunset Way near the north end of the corridor, and the main stem of Issaquah Creek flows parallel to the corridor on the opposite side of Front Street South.

5.3.2.1 Issaquah Creek and Minor Tributaries

Issaquah Creek is the largest tributary to Lake Sammamish, contributing approximately 70 percent of the total inflow to the lake (Metro, 1995). The total watershed of Issaquah Creek comprises approximately 14,400 ha (35,600 ac). Issaquah Creek is rated as Class 1, based on the stream rating system adopted by the City of Issaquah, requiring at least 30-m (100-ft) buffers (Issaquah, 1996). The mean annual flow in the main stem of Issaquah Creek is approximately 2.5 cu m/sec (90 ft^3/sec) in the reach to the west of the Southeast Issaquah Bypass corridor (King County SWM et al, 1991). The total annual flow in the main stem of the creek is influenced to a minor extent by inflows from the East Fork, but the East Fork is its largest tributary.

Flooding has historically occurred in Issaquah Creek and its tributaries, and flooding problems in the vicinity of downtown Issaquah have been severe in recent years. Property losses from flooding in the lower Issaquah Creek subbasin are among the most extensive in the county. Flooding conditions may worsen as development continues to occur in the Issaquah Creek watershed. In that reach of Issaquah Creek closest to the Southeast Issaquah Bypass project site, the creek frequently overflows the right bank along Front Street South, flooding several houses at 2nd Avenue Southeast (King County SWM et al, 1991). Flooding in the creek causes tributary drainage systems to back up and flood surrounding properties. This type of flooding is common in those drainage ditches associated with the southern end of the Southeast Issaquah Bypass corridor. Figure 8 shows the location of the Issaquah Creek 100-year floodplain.

The north tributary to Issaquah Creek lies adjacent to the proposed roadway at the south end of the project corridor. This small stream should conservatively be considered as Class 2 with salmonids according to the city's critical areas ordinance, because it is uncertain whether salmonids use the stream (HDR, 2002). Streams in this classification require 100-foot buffers (Issaquah, 1996). In this particular setting, the buffer for the north tributary is the buffer required for the adjacent wetland (Issaquah, 1996). The stream originates as groundwater seeping out of the hillside east of the project corridor, near the base of the hillslope below the Lake Tradition Plateau, and flows through surrounding wetlands toward the west. It appears that the project area between the church and Issaquah High School drains into this stream. There are no recorded flow data or modeled flow estimates available for this stream. It is likely that this stream flows most of the year and that in late summer it is typically dry or stagnant. Downstream (west) of the project corridor, this stream flows through private properties and a manmade pond, then crosses Front Street South in a culvert and flows into Issaquah Creek via a natural channel.

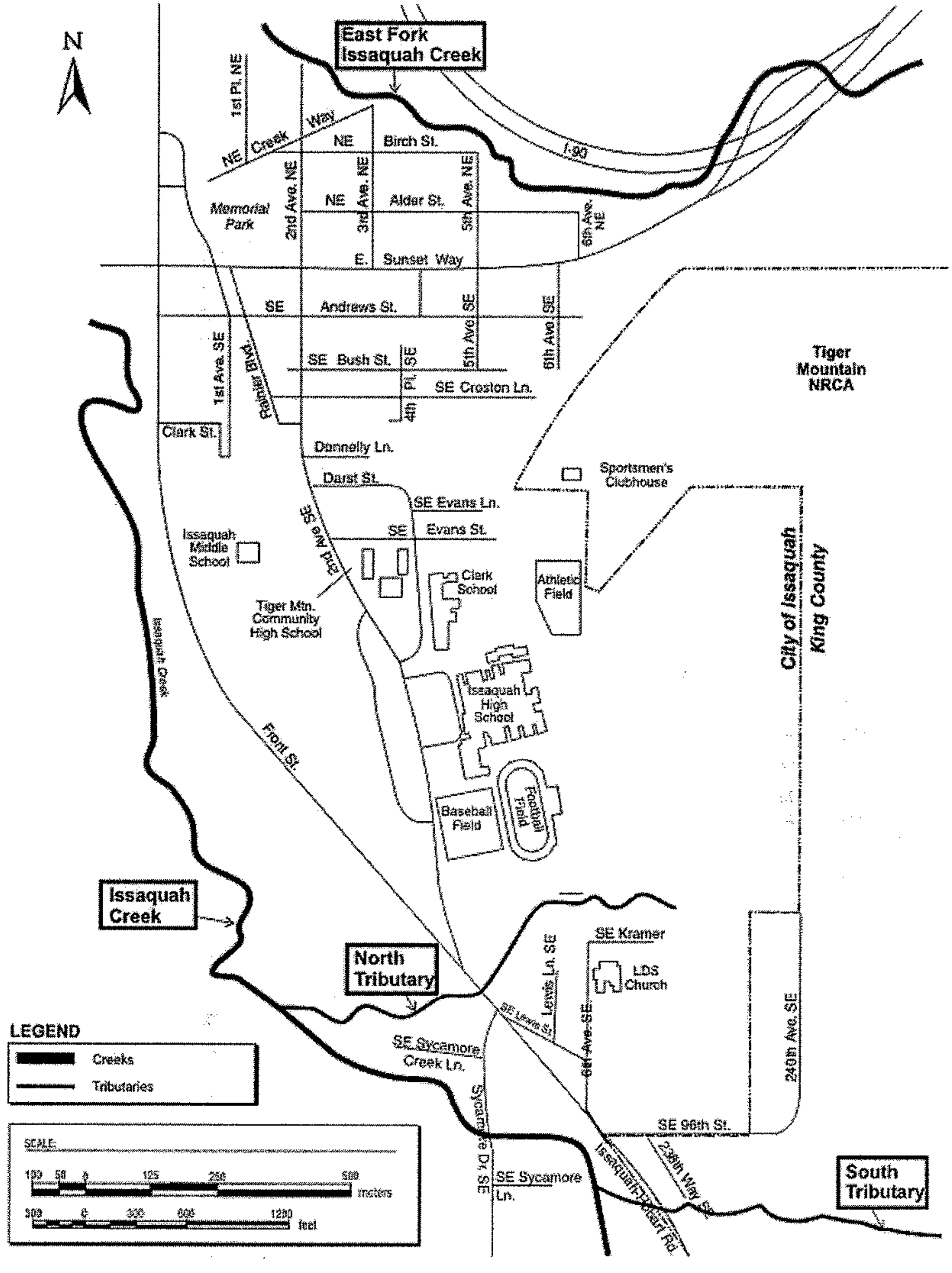
5.3.2.2 East Fork Issaquah Creek

East Fork Issaquah Creek flows westward through the I-90/East Sunset Way interchange site beyond the north end of the proposed project corridor and into the main stem of Issaquah Creek approximately 1.7 km (1 mi) west of the overpass bridge in the center of the expanded interchange. East Fork Issaquah Creek is rated by King County (1990) as Class 2 with salmonids upstream of I-90/East Sunset Way interchange and as Class 1 downstream of the interchange.

Throughout the project area and downstream, the East Fork requires at least 30-m (100-ft) buffers (Issaquah, 1996). The East Fork originates on the northeast slopes of Tiger Mountain, approximately 5.5 km (3.5 mi) southeast of the I-90/East Sunset Way interchange, and flows adjacent to I-90 for much of its length in those reaches upstream of the project site. The mean annual flow in the East Fork is approximately 0.54 m^3/sec (19 ft^3 /sec) in the I-90/East Sunset Way interchange vicinity (King County SWM et al, 1991). The watershed of the East Fork, upstream of and including the interchange site, exceeds 2,000 ha (5,000 ac), most of which is forested.

Flooding also occurs in residential and commercial areas along the East Fork near its confluence with the main stem in downtown Issaquah.

Because of the relatively high level of development occurring on the Sammamish Plateau in recent years, the Issaquah Creek system has been experiencing lower water volumes. In 2001, the North Fork of Issaquah Creek, located approximately 1.6 km (1.0 mi) northwest of the proposed project area, experienced its longest dry period in recorded history; more than two months with no measurable flow. In studying this situation, hydrology experts at Ecology concluded that the entire Issaquah Creek system could be in danger of widespread failure due to over development. High levels of development have lowered the water levels of the underlying aquifer that feeds the system. Generally, replacing natural conditions with new concrete and pavement reduces the amount of water that can seep down and recharge the aquifer. Groundwater withdrawal from wells has also contributed to a decline in surface water flows and lowered stream levels.



Not to scale

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Figure 7

Project Area Streams Map
SE Issaquah Bypass
King County, Washington

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Figure 8

Issaquah Creek 100-Year Floodplain Map
SE Issaquah Bypass
King County, Washington

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King County and local cities, including Issaquah, have been encouraging water conservation and are working with the Sammamish Plateau Water and Sewer District to determine longer-term methods of preserving stream flows. Additionally, King County is preparing a regional water supply plan to address water allocation issues throughout the county.

5.3.2.3 Wetlands

There are no wetlands identified within the northern portion of the proposed project route. Two wetland areas exist in the southern portion of the project area, which will be affected by the proposed project (Figure 9). These wetlands consist of a 0.4-ha (1-ac) scrub/shrub wetland (Wetland HS) and a 10-ha (26-ac) forested wetland (Wetland GW). Wetland GW is considered a Class 1 wetland by the City of Issaquah and Wetland HS is considered a Class 3 wetland. Class 1 wetlands have the highest natural values and Class 3 have lower values.

Wetland HS is an isolated palustrine scrub/shrub wetland totaling 0.4 hectare (1 ac) located just north of the abandoned railroad grade and south of the Issaquah High School football field (Herrera and Associates, 1998) that will be extensively altered by project construction. Overstory vegetation includes red alder (*Alnus rubra*), western red cedar (*Thuja plicata*), and black cottonwood (*Populus balsimifera*), with a shrub understory of salmonberry (*Rubus spectabilis*), hardhack (*Spirea douglasii*) and western red cedar and red alder saplings. Herbaceous species include reed canarygrass (*Phalaris arundinacea*), lady fern (*Athyrium filix-femina*), slough sedge (*Carex obnupta*) and soft rush (*Juncus effuses*). Hummocks within the wetland support upland species such as Himalayan blackberry (*Rubus discolor*), salal (*Galtheria shallon*), sword fern (*Polystichum munitum*), and red huckleberry (*Vaccinium parviflorum*) (Herrera and Associates, 1998b).

As noted previously, wetlands are an important component of the drainage systems in the southern half of the project corridor. Runoff from most of the land area between Issaquah High School and Southeast 96th Street originates in or flows through wetlands prior to reaching constructed drainage ditches and piped storm drain systems that convey flows to Issaquah Creek. Although these wetlands serve an important function for recharge of shallow groundwater, the extent of overland flow in the southern portion of the proposed project corridor indicates that infiltration of surface water is limited, most likely by the high water table. Much of the outflow from the wetland area in the southern part of the site is conveyed in the north tributary to Issaquah Creek. Outflows from the wetlands in this area also occur in several drainage ditches, among them a ditch on the north shoulder of Southeast 96th Street, a ditch along the south edge of the LDS church property, and several ditches west of 6th Avenue Southeast. There is extensive hydrologic connectivity between the wetlands and the associated downstream conveyance systems in the southern portion of the project area.

5.3.2.4 Fish and Wildlife Habitat

The proposed project area is located in a narrow valley oriented north to south, between Squak Mountain and West Tiger Mountain NRCA. Issaquah Creek flows north through this valley to the west of the proposed project route. The East Fork of Issaquah Creek, the largest tributary of Issaquah Creek, flows through the East Sunset Way/I-90 Interchange area near the northern end of the project corridor. Two unnamed tributaries, identified as the north and south tributaries to Issaquah Creek, flow from east to west at the southern end of the proposed project area. A large, forested wetland is located in the southern portion of the project area.

These areas provide habitat for a variety of plant and animal species. Salmonids and other fish species use Issaquah Creek and the East Fork of Issaquah Creek and may use the smaller tributaries. The riparian zones adjacent to the creeks, and the wetland and forested areas provide a mosaic of habitat for a number of avian and terrestrial animal species. Surveys of the project area identified 39 bird species within the project area (Herrera and Associates, 1998b). Surveys of the nearby West Tiger Mountain NRCA found 75 bird and 59 mammal species (Young, 1997). Bird habitat is good due to the mosaic of habitat types including an area of snags in the northern section and wetland and upland shrub areas in the southern section. Many of these bird species are protected under the Migratory Bird Treaty Act. The project sits on the west edge of the West Tiger Mountain NRCA, which provides high quality wildlife habitat, particularly for larger mammal species such as deer, cougar, and bear. However, because it is close to an urban area, these animals generally avoid the project area. The project area also provides high quality habitat for amphibians, with a mixture of wetland areas for breeding and wooded upland areas for rearing and foraging.

5.4 LAND USE

The proposed project is mostly within the City of Issaquah; however, some small parts of the new roadway will cross sections of unincorporated King County. Land uses along the proposed project corridor include a mix of residential, community facilities, and recreational uses. Undeveloped properties are also present. The northern part of the proposed project area includes residential neighborhoods near East Sunset Way. The West Tiger Mountain NRCA is located east of East Sunset Way. The Issaquah Sportsmen's Clubhouse, Issaquah High School, Tiger Mountain High School, and Clark Elementary School facilities are located near the middle portion of the proposed project route. A large mixed-use residential and commercial development project, known as Park Pointe, is proposed in this area near the east end of Southeast Evans Street.

Further south, low-density residential uses and undeveloped land transition to a residential area along 6th Avenue Southeast, which also includes the LDS church. The extreme southern portion of the proposed project area (outside the project alignment) includes low-density residential uses and undeveloped land.

Zoning designations in the proposed project area within the city include multi-family and single family, community facilities, and rural areas. In unincorporated King County, zoning designations include rural residential and forest areas.

5.5 REGIONAL AND COMMUNITY GROWTH

The populations of Issaquah and the unincorporated portion of east King County in which the proposed project will be located have been increasing steadily in recent years. According to forecasts in the city and county comprehensive plans, both jurisdictions project population growth to continue during the next 20 years. Total population in Issaquah is expected to increase by approximately 64 percent, and total household growth is expected to increase by approximately 57 percent by 2020. Total population within the unincorporated area of King County that will include the proposed project is expected to increase by approximately 58 percent, and total household growth in the same area is expected to increase by 75 percent by 2020.

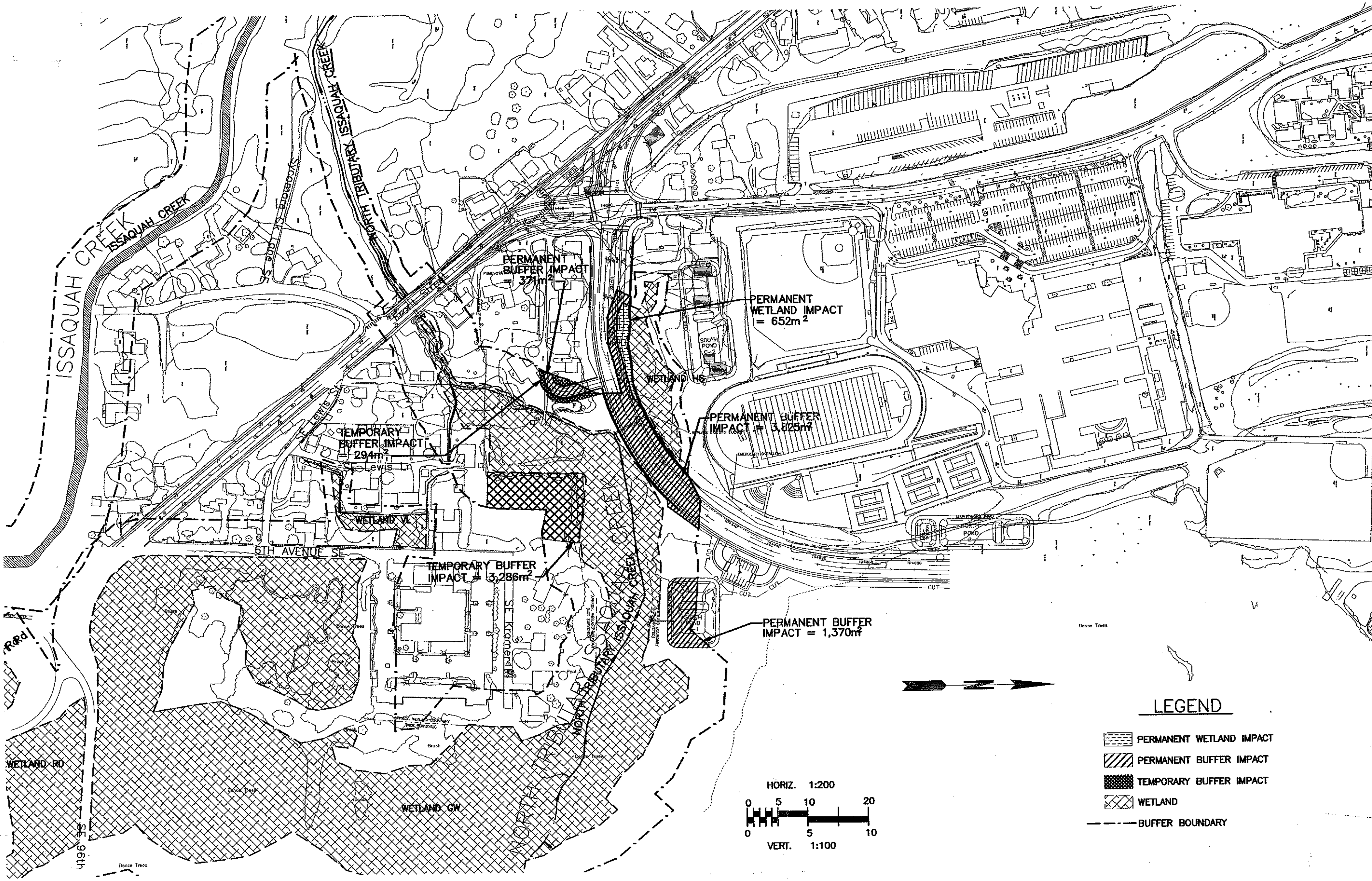

Figure 9

Wetland and Buffer Impact Map
SE Issaquah Bypass
King County, Washington

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5.6 HAZARDOUS WASTE

There are few existing hazardous waste sites along the proposed project route. A north/south trending electric distribution line is present along or near much of the project area that could have electrical transformers that contain mineral insulating oil or other PCBs. A former trapshooting range west of the current shooting range could contain high levels of lead, and a former landfill site exists near Southeast Evans Street in the northern portion of the project area. Residential areas adjacent to the proposed project corridor may include hazardous materials, such as residential heating oil. Residences that are more than ten years old could also include asbestos or lead-based paint in some structures.

6.0 ENVIRONMENTAL BASELINE

The proposed project will occur within the Issaquah Creek subbasin of the Cedar-Sammamish watershed. The subbasin is located in western Washington and is bounded by Tiger Mountain, Tradition Plateau and Grand Ridge to the east, which rise to 800 m (2,624 ft) and by Squak Mountain to the west, which rises to 567 m (1,860 ft). The watershed is defined by the Issaquah Creek Valley, which runs from south to north between the two mountains. The Issaquah Creek subbasin encompasses approximately 158 km^2 (61 mi^2). Major tributaries including East Fork Issaquah Creek and North Fork Issaquah Creek flow into the lower reaches from smaller valleys to the east. The upper basin of the watershed is within the protected areas of Tiger and Squak Mountains. The lower basin is within the urbanized areas of the City of Issaquah. The project area is located within the lower basin.

6.1 WATER QUALITY

Issaquah Creek is on the 303(d) list for temperature downstream of the project area at the Issaquah Fish Hatchery (WDOE, 2003) High water temperatures generally only occur in late summer/early fall when fall chinook enter and spawn in Issaquah Creek. Issaquah Creek is also on the 303(d) list for fecal coliform and the East Fork Issaquah Creek also exceeds water quality standards for fecal coliform. Six percent of pH measurements between 1991 and 1997 were beyond the upper criterion, although this was below the threshold for a 303(d) listing. Issaquah Creek also has high concentration of suspended sediments, nitrate and nitrite, and total phosphorous during storm events (Parametrix, 2002).

Issaquah Creek and East Fork Issaquah Creek naturally have relatively high sediment loads (Parametrix, 2002). Through changes in storm runoff patterns and loss of pervious surfaces in the both the lower and upper watershed, sediment loads are increasing. The confined stream channel has lost much of its ability to meander and create natural sorting and depositional processes, and spawning gravels exhibit some embeddedness (Parametrix, 2002). Within the project area, the north tributary is a very small stream dominated by fine sediments (Herrera and Associates, 1998a). The gradient and flow are low enough that the high silt and sand content is a natural condition.

6.2 HABITAT ACCESS

The Issaquah salmon hatchery on Issaquah Creek has a weir, but some fish are able to pass over it during high flows (Parametrix, 2002). Excess coho and chinook and all other species are passed above the weir and allowed to spawn naturally. The hatchery intake diversion dam upstream of the hatchery on Issaquah Creek acts as a partial barrier at some flows. No barriers exist on the East Fork Issaquah Creek. The north tributary has a small dam apparently constructed by a homeowner to create a pond just above the culvert under Front Street South that appears to act as a barrier.

6.3 HABITAT ELEMENTS

Habitat elements within the Issaquah Creek watershed have been altered by land uses such as road building, timber harvest, and urban development (Parametrix, 2002)

Average substrate size in Issaquah Creek ranges from 19 to 36 mm with percentage of fines ranging from 0 to 29 percent (mostly averaging 8-10 percent). Embeddedness over much of Issaquah Creek is 20 to 40 percent (Parametrix, 2002). East Fork Issaquah Creek substrate is also highly embedded cobble and large gravel (Parametrix, 2002). The north tributary does not have spawning gravels, and all of the substrate is silt or sand (Herrera and Associates, 1998a)

Existing LWD (large woody debris) is absent in most reaches with only one key piece in the entire mainstem of Issaquah Creek within the city limits and none in East Fork Issaquah Creek within the city limits (Parametrix, 2002). LWD recruitment potential is moderate to low for lower stream reaches, but increases in the headwater reaches. LWD frequency is slightly better in the north tributary, but still poor due to a lack of large riparian trees near the channel (Herrera and Associates, 1998a).

Pool frequency in Issaquah Creek and East Fork Issaquah Creek is limited due to channelization and lack of LWD (Parametrix, 2002). Pool frequency in the north tributary is also poor (Herrera and Associates, 1998a).

Functional pools are almost nonexistent in the lower reaches of Issaquah Creek and East Fork Issaquah Creek due to shallow depths and filling with sediments (Parametrix, 2002). Likewise, pool quality in the few pools in the north tributary is poor, with little rearing habitat present (Herrera and Associates, 1998a)

Due to channelization and floodplain encroachment, there is little room for off-channel habitat forming processes in the lower reaches of Issaquah Creek or East Fork Issaquah Creek. Only six side channels were identified within Issaquah Creek and three of those were created in the lowest reaches of the stream during restoration efforts (Parametrix, 2002). Some of the more protected small tributaries such as the north tributary could provide refugia from storm flows similar to that provided by side channels. In the upper reaches of the watershed, stream gradients are generally too high to allow off-channel habitat formation.

Refugia are limited within the mainstem of Issaquah Creek and the lower reaches of its tributaries by lack of LWD, poor quality and low frequency of pool habitat, little off channel habitat, and confined stream channels. More refugia are present upstream of the project area in the upper Issaquah Creek watershed and various tributaries. Portions of the habitat refugia exist within the watershed but are not well buffered; the riparian system is thin and patchy because of the adjacent land uses throughout the basin. The refugia that do exist are insufficient in size, number, and connectivity.

6.4 Channel Conditions and Dynamics

Based on field observations, Issaquah Creek near the project area has a moderate to high width/depth ratio. The channel is generally wide and shallow with a fairly uniform bottom. The upper reaches of the watershed are higher gradient and moderately constrained. Therefore, the width/depth ratio is likely to be properly functioning in those portions of the watershed.

Streambank stability in the lower reaches of Issaquah Creek and East Fork Issaquah Creek is generally high although several significant areas of bank erosion exist (Parametrix, 2002). However, approximately 20 to 50 percent of the streambanks in Issaquah Creek and East Fork Issaquah Creek are armored or otherwise modified. The north tributary within and upstream of the project area has very stable banks due to the small size of the stream and the dense wetland vegetation that stabilizes the stream banks.

Floodplain connectivity is not properly functioning along Issaquah Creek and East Fork Issaquah Creek because of development in the floodplain, channelization, incision, and lack of LWD (Parametrix, 2002). Within the project area the north tributary is well connected to the wetland area, which serves as a floodplain (Herrera and Associates, 1998a).

6.5 Flow/Hydrology

Issaquah Creek has been affected by the creation of impervious surfaces from urbanization, vegetation removal and other disturbances. Currently base flows are below historical levels and show continued downward trends, while annual peak flows show an increase in magnitude. Parametrix (2002) estimated that urbanization accounts for an approximately 8 percent increase in the 100-year flood event over pre-development conditions. Within the project area, East Fork Issaquah Creek and the north tributary have less intensive development in their watersheds but are still subject to altered peak and base flows (Parametrix, 2002).

Roads and other human disturbances are common in the lower Issaquah Creek watershed. In the middle part of the mainstem, agriculture has created some diversion and channelization of small tributaries, increasing the drainage network.

6.6 WATERSHED CONDITIONS

Road density is extremely high in the lowest reaches of Issaquah Creek and its tributaries due to urbanization in the City of Issaquah. In the middle of the system, where the land use is rural and agricultural, road density is moderate. In the highest reaches of Issaquah Creek and its tributaries, road density is low.

Urbanization, timber harvest and other human disturbances have caused degradation of most stream health parameters in the Issaquah Creek watershed over the past 100 years. Generally, the upstream reaches within the system are in better condition than the lowest reaches.

Riparian areas upstream of the project area and in headwater tributaries are generally recovering from historic timber harvesting; however, stream incision has reduced available riparian areas, and roads and road grades continue to disrupt the connectivity of the riparian areas and constrict floodplain development. Urbanization and channelization in the lower reaches of Issaquah Creek and its tributaries has heavily disturbed riparian areas.

7.0 ANALYSIS OF EFFECT

This section addresses possible impacts resulting from the proposed action. The effects are considered for the project action area. Section 7.1 discusses potential site-specific impacts, Section 7.2 presents Minimization and Avoidance Measures, Section 7.3 describes the likely impacts to the Issaquah Creek watershed Environmental Baseline for listed fish species, and Section 7.4 describes the likely impacts to Puget Sound chinook salmon critical habitat.

7.1 POTENTIAL SITE-SPECIFIC IMPACTS

This subsection addresses site specific impacts to fish, wildlife and habitat that may result from the proposed project given the conservation measures to be employed. These potential impacts include 1) construction impacts (physical harm to fish and wildlife), 2) impacts to water quality, 3) changes in channel conditions and flow dynamics, 4) degradation of wetland and riparian areas, and 5) degradation of wildlife habitat.

7.1.1 Construction Impacts

Direct impacts to fish, wildlife and habitat can occur during construction activities. Fish and wildlife can be killed or injured by equipment operating within their habitat, nesting and rearing areas can be destroyed during construction and other habitat can be physically removed. Operation of equipment near or within a stream has the potential to disturb the stream channel or stream bank, or individuals of various fish and wildlife species. Blasting and vibrations from heavy equipment can cause direct mortality to fish and wildlife within or near the project site.

7.1.1.1 Equipment Operation

Construction of the main road will occur near the north tributary within the action area, while construction of a stormwater outfall will occur near East Fork Issaquah Creek. All construction equipment will be operated from upland areas and will not enter the stream or work near the stream banks (with the exception of a small area around the stormwater outfall on East Fork Issaquah Creek). No fish are likely to be directly impacted during construction.

Wildlife species will be directly impacted by equipment during construction. Removal of trees and shrubs and compaction of the ground will likely directly kill or injure many smaller wildlife species that use these areas for nesting or denning such as mice, shrews, squirrels, birds, amphibians and reptiles and other species.

7.1.1.2 Blasting and Vibrations

No blasting is anticipated. Heavy equipment working next to a stream could cause vibrations that could directly affect fish, or damage their eggs or alevins residing in the substrate. No pile driving will be conducted as part of the project and work near streams will be limited to placing a stormwater outfall along East Fork Issaquah Creek (which will be accomplished from the top of the bank) and work along a small section of the north tributary that is unlikely to contain fish.

7.1.2 Water Quality

The condition and quality of the water that the fish encounter on their migration is extremely important, and can determine such things as feeding and breeding success rates, disease levels, growth rates, and predation rates. Major elements of water quality critical to salmon are turbidity/sediment levels, chemical contamination, and temperature. Turbidity and fine sediments can reduce prey detection, alter trophic levels, reduce oxygen along the substrate, smother redds, and damage gills, as well cause other deleterious effects. Chemical contamination can alter fecundity and fertility levels, increase disease, shift biotic communities, and reduce the overall health of migrating salmon. Temperature affects metabolic rates, resistance to disease, oxygen levels in the water, and other vital factors.

Possible impacts to north tributary water quality associated with this project could occur from chemical contamination, increased turbidity levels, and changes in stream temperature. In addition to the erosion and sediment control plan, containment measures will be developed to reduce the probability of negative impacts to current water quality conditions.

7.1.2.1 Chemical Contamination

Possible chemical contamination of the north tributary and possibly Issaquah Creek could occur when activities involving hazardous materials occur in areas that have direct or indirect hydrologic connections to the creek. These activities include asphalt-concrete application, lane painting and striping, and vehicle/equipment fluid leaks. An additional source of chemical contamination is increased stormwater runoff associated with the increased impervious surface area of the proposed road. The stormwater system has been designed to minimize the amount of chemical contaminants entering the groundwater or streams from stormwater runoff. The potential for large spills of hazardous materials exists when the road is in use, but because the project does not cross a stream and stormwater is conveyed to discrete locations, emergency response should be able to contain any spills before they reach a stream.

7.1.2.2 Turbidity

Potential increases in turbidity will be limited to activities associated with construction of the outfall from stormwater ponds leading into East Fork Issaquah Creek and the north tributary, road bank cut and fill and soil disturbance during vegetation clearing. In addition, potential turbidity increases may result from grading activities associated with the Site Restoration Plan. With proper implementation of the Erosion Control and Pollution Control Plan, turbidity from stormwater runoff or other sources within the project area will be minimal.

7.1.2.3 Stream Temperature

Removal of riparian vegetation can cause elevated stream temperatures. Solar radiation is the principal energy source that causes stream heating. Shading reduces direct solar radiation loading and stream heating. Removal of riparian vegetation within the action area is necessary for bridge improvement. Approximately 20 trees will be removed from the north tributary riparian area to facilitate road construction activities. Small trees and shrubs will be left in place to provide continued stream shading, and new trees will be planted in the area following construction. Because the trees to be removed are so few in number and they are located on the north side of the north tributary, they do not provide a significant amount of stream shading. Removal of these trees is not likely to result in a measurable increase in stream temperatures of the north tributary.

7.1.3 Channel Conditions and Flow Dynamics

Channel conditions and dynamics are influenced and affected by a number of structures, functions, and processes. Changes in impervious surface area and riprap are two agents typical to transportation projects that can be responsible for channel condition and flow dynamics alterations. Additional impervious surfaces can alter the water quality, hydrology, and habitat complexity of a watershed. Increased roadway area provides additional opportunities to collect and store chemicals released from automobiles. The reduction in infiltration capacity can increase the rising limb of a storm hydrograph, resulting in a flashy system, increased erosion, and reduced groundwater storage. The increase in erosion can lead to simplification and channelization of the stream, while the reduced groundwater storage can alter the base flows of the drainage.

7.1.3.1 Surface Water Impacts

Direct impacts (e.g., permanent physical alterations) to existing drainage conveyance systems will result from the proposed project where the new roadway infrastructure requires displacement or replacement of an existing storm drain, culvert, catch basin, or ditch. These types of conveyance system modifications will occur in the vicinity of the new intersection of the Southeast Issaquah Bypass, Front Street South, and 2nd Avenue Southeast.

The project will not disrupt the movement of flow out of the large forested wetland system at the south end of the project corridor. The project has been configured to preserve existing hydrologic connectivity. The roadway will not cross the north tributary, nor will it alter any other significant flow pathways (other than via inclusion of a new, larger culvert to replace the existing culvert through the former railroad right-of-way south of Wetland HS).

The long-term operations of the Southeast Issaquah Bypass will result in modifications to existing stormwater runoff characteristics in the area. As shown in Table 3, the project will result in an increase in surface runoff volumes discharged to streams in the southern portion of the project area. All of the increase in overland flow volume will occur in the south end of the project site.

Discharges from South Pond C2 (combined treatment and detention, located between the Issaquah High School baseball field and Wetland HS), and South Pond C-3 (also combined treatment and detention, located west of the new intersection of the Southeast Issaquah Bypass, Front Street, and 2nd Avenue Southeast) will be directed to the north tributary, resulting in greater volumes of flow passing through the stream to Issaquah Creek downstream. Outflows from ponds C-2 will enter the stream in the immediate vicinity of the Southeast Issaquah Bypass roadway corridor, whereas the outflow from pond C-3 will enter the north tributary at the crossing of Front Street South further to the west.

The peak rates of flow discharged from these ponds to the stream will not be expected to cause erosion of the channel or flooding of the stream corridor because the outflows will be controlled to resemble forested runoff characteristics as required with King County Level 2 flow control criteria. All of the runoff from new impervious surfaces in the south end of the roadway corridor will be controlled to match predevelopment peak flow amounts and duration.

During and after storm events, the north tributary will most likely exhibit a prolonged period of moderate flows for up to a few days. The relatively flat gradient and shallow depth of the north tributary is not conducive to channel erosion, though the increased prevalence of moderately high flows could result in greater incidence of minor overbank flooding between the Southeast Issaquah Bypass roadway and Front Street South.

Although the new impervious surfaces and associated discharges of site runoff to surface waters in the wet season may cause a slight reduction in the amount of water available for dry season baseflows in the north tributary, infiltration of substantial amounts of roadway runoff at South Pond C-1 would likely help to offset these potential baseflow reductions in the north tributary. It is expected that runoff infiltrated in the vicinity of this proposed pond would travel slowly through the subsurface and re-emerge in wetland GW north of the LDS church (Beaman, 2003).

Table 6 summarizes site runoff characteristics under existing and developed conditions, and expected changes to the average annual flow volume in the East Fork and main stem of Issaquah Creek. The data presented in Table 6 are extracted from the same calculations used for Table 3, but Table 6 separates the surface runoff and groundwater infiltration estimates for the northern and southern portions of the site (i.e., site areas within the East Fork Issaquah Creek drainage basin and main stem Issaquah Creek drainage basin, respectively).

Table 6. Annual Changes to Surface and Groundwater Hydrology from Project Development

Drainage Basin	Runoff Volumes are in cubic meters (acre-feet)			Infiltration Volumes are in cubic meters (acre-feet)		
	Total Existing Overland Runoff Volume	Total Developed Surface Discharge Volume	Change in Surface Discharge Volume	Total Existing Infiltration Volume	Total Developed Infiltration Volume	Change in Infiltration Volume
East Fork Issaquah Cr.	8,811 (7.1)	8,091 (6.6)	**-720 (-0.6)**	48,128 (39.0)	66,410 (53.8)	**18,282 (14.8)**
Mainstem Issaquah Cr.	22,320 (18.1)	38,400 (31.1)	**16,080 (13.0)**	33,317 (27.0)	27,951 (22.7)	**-5,366 (-4.3)**

The estimated volumes of runoff discharged to East Fork Issaquah Creek and the mainstem of Issaquah Creek under existing and developed conditions are based on an approximation that 70% of the area encompassed within the north alignment alternatives drains to the East Fork, with the remainder of those areas draining southward towards Wetland GW, Wetland HS, and the north tributary to Issaquah Creek. Table 6 is primarily useful for assessing surface water hydrologic changes. Almost all runoff that infiltrates in the project area reaches the underlying lower Issaquah valley aquifer that extends far beyond the project limits, therefore the distinction of whether the flow infiltrates in the East Fork or main stem Issaquah Creek drainage basin is not significant.

With infiltration of flow from the new impervious surfaces in the northern portion of the project site it is estimated that the average annual overland flow volume (surface discharge) discharged to East Fork Issaquah Creek would decrease by roughly 720 m^3 (0.6 ac-ft) per year. Overland runoff emanates from the project site and reaches the East Fork under existing conditions, whereas the proposed infiltration ponds under the build alternatives will be designed to capture and infiltrate nearly all on-site runoff up to the 50-year storm event. The average annual flow in East Fork Issaquah Creek is approximately 0.54 m^3/sec (19 ft^3/sec), or 17 million m^3 (600 million ft^3) in a year. The reduced discharges to East Fork Issaquah Creek will correspond to less than 0.01 percent of that annual flow.

Infiltration of all of the runoff from the south end of the project is not possible; therefore runoff discharge volumes into the north tributary are expected to increase slightly. Based on an average annual discharge of 2.5 m^3/sec (88 ft^3/sec) in Issaquah Creek, the increased runoff volume caused by the proposed project will represent an increase of approximately 0.01 to 0.02 percent of the average annual flow volume in the main stem of Issaquah Creek. The proposed (and required) flow control facilities will be designed to prevent adverse effects on flooding conditions in Issaquah Creek immediately downstream of the project site for all storm events up to approximately the 50-year recurrence interval flood event. It is difficult to define this threshold because the timing of watershed flooding events versus on-site stormwater discharges (which will be controlled up to the 50-year event) will not likely be coincident. During and following storms, the on-site runoff discharges will most likely enter Issaquah Creek prior to the peak flood wave from upstream in the watershed.

7.1.3.2 Groundwater Impacts

In addition to minor surface runoff impacts, the project will result in changes in shallow groundwater recharge patterns (Table 6). Precipitation and runoff from the project area will infiltrate the ground and recharge shallow groundwater. This infiltration will occur along the northern section of the proposed Southeast Issaquah Bypass roadway and in some of the off-road areas in the southern portion of the project site. The volume of precipitation and runoff infiltrating the ground in the northern portion of the project site will increase relative to existing conditions, because removal of existing vegetation in that area will increase the amount of water that reaches the ground surface (given the same rainfall characteristics whether or not the project is built). The rainfall interception and evapotranspiration associated with existing vegetation will cease to occur within the footprint of the proposed roadway improvements. As a result, more rainfall will infiltrate the ground surface (mostly via engineered infiltration ponds) and migrate to the groundwater aquifer if the project is constructed than what does so under current conditions.

In the developed condition, it is estimated that the volume of precipitation and runoff that will infiltrate the ground within the proposed project limits in an average year will increase by approximately 12,916 m^3 (10.5 af). This will represent an increase in groundwater recharge of approximately 16 percent over existing conditions in a typical year. Although the increase in groundwater recharge will be minimal in relation to the total groundwater recharge occurring in the Issaquah area, it should help improve base flows in the mainstem of Issaquah Creek as well as benefit nearby wells to the northwest, including the municipal production wells near I-90.

7.1.3.3 Channel Conditions

The proposed project will not involve work within the active channel; therefore, no direct impacts to channel conditions will result. However, a stormwater outfall will be constructed at or just above the channel of East Fork Issaquah Creek, which would require some work within the regulated work area. Approximately 20 riparian trees will be removed along the north tributary, which will remove a potential source of LWD for the north tributary. However, these trees would be left within the active channel area for LWD and approximately the same number of riparian trees will be planted in the general area where they were removed, therefore no long-term reduction in available LWD will occur.

7.1.4 Degradation of Wetland and Riparian Areas

Wetlands and riparian areas directly influence fish habitat structure and function, as well as indirectly affect a multitude of hydrologic and biochemical processes. Intact wetland and riparian areas are responsible for water quality treatment, storm event infiltration, groundwater storage, and other biochemical and hydrologic processes vital to properly functioning habitat conditions. Riparian vegetation influences shading, organic inputs, streambank stabilization, channel complexity, and soil properties.

7.1.4.1 Wetland Impacts

Approximately 652 m^2 (0.16 ac or 7,018 ft^2) of permanent wetland impacts and 6,212 m^2 (1.54 ac or 66,865 ft^2 of permanent wetland buffer impacts and no temporary wetland impacts are associated with the proposed project (Table 7). Permanent wetland impacts are limited to Wetland HS immediately north of the roadway at the south end of the project.

Table 7. Wetland Impacts

Permanent Wetland Disturbance m^2 (ac)	Temporary Wetland Disturbance m^2 (ac)	Permanent Wetland Buffer Disturbance m^2 (ac)	Temporary Wetland Buffer Disturbance m^2 (ac)
6,212 (0.16)	0.00 (0.00)	6,212 (1.54)	1,893 (0.47)

These wetland and wetland buffer impacts will result in a marginally reduced capacity of water quality treatment, storm event infiltration, groundwater storage, and other biogeochemical and hydrologic processes vital to properly functioning habitat conditions for the project area. Approximately 1,893 m^2 (0.47 ac or 20,376 ft^2) of temporary wetland buffer impacts will occur in mostly in Wetland GW with some buffer impacts in Wetland HS. These temporary wetland buffer impacts will slightly impact the hydrologic processes described above, however as the area is revegetated these processes will recover.

7.1.4.2 Riparian Vegetation Impacts

Vegetation removal carries many of the same potential effects as wetland loss. The majority of the vegetation proposed for removal as a result of the proposed project is composed of grass and forb species. Construction of the proposed roadway will require removal of a small amount of riparian vegetation where the road is adjacent to the north tributary. A total of approximately 20 small, deciduous trees will be removed.

7.1.5 Changes to Wildlife Habitat

Although there are no large areas of contiguous wildlife habitat within the City of Issaquah, the construction of a linear road corridor along the base of the Tiger Mountain and Tradition Lakes NRCA will constitute a barrier to wildlife movement between the City of Issaquah and the Tiger Mountain area. Many smaller areas of wildlife habitat do exist within the City of Issaquah. Few large mammals currently cross between these areas but many smaller birds, mammals, reptiles and amphibians do utilize this corridor. Construction of the road will severely limit the ability of these smaller, less mobile animals to move between these habitats. Also, construction of the road itself will remove wildlife habitat at the base of the Tiger Mountain NRCA. The additional disturbance from traffic and human presence will tend to drive away some animals that are not tolerant of disturbance. Other animals trying to cross the road to access historical habitats may be killed by collisions with automobiles.

7.2 MINIMIZATION AND AVOIDANCE MEASURES

Conservation measures have been incorporated into the project design to minimize and avoid impacts to fish and wildlife and their habitat. These measures address potential impacts to water quality, stream channel, fish, wetlands, riparian areas, and wildlife. In addition, the project design has gone through extensive review and revisions to minimize impacts commonly associated with transportation projects.

7.2.1 Water Quality

The following minimization and avoidance measures will be implemented to prevent reduction of water quality or acute toxicity to fish from leaks or accidental spills of fuel, oils, chemicals, concrete leachate, or other hazardous or toxic materials:

- The contractor will prepare and follow a Spill Prevention Plan to ensure that any spills of hazardous or other materials are properly contained and cleaned up as soon as they happen and to prevent materials from entering streams, wetlands, or riparian areas.
- All construction equipment and vehicles will be outfitted with spill containment kits.
- Any construction equipment working within 45 m (150 ft) of the OHWM of the north tributary or East Fork Issaquah Creek will be outfitted with a diaper to contain drips or leaks of hydraulic fluid, oil, diesel or other hazardous materials.
- Equipment storage, refueling and maintenance will not occur within 152 m (500 ft) of any stream, wetland, or riparian area.
- Construction equipment will be maintained in good working order and will be inspected each day for leaks. If a leak is found, the equipment will be immediately moved to an upland location and repaired.
- Equipment and vehicles used for transport or mixing of concrete will not be rinsed within 152 m (500 ft) of streams, wetlands, or riparian areas.
- Pollutants (i.e., waste spoils, petroleum products, fresh concrete cured less than 24 hours, silt, welding slag and grindings, concrete saw cutting by-products, sandblasting abrasive, etc.) will be contained and will not come in contact with any wetland, waterway or stream.

The following minimization and avoidance measures will be implemented to prevent reduction in water quality or stream substrate quality from sediments associated with road construction:

- Runoff from construction sites will be minimized by using standard TESC Best Management Practices (BMPs). Also a National Pollutant Discharge Elimination System (NPDES) Construction Permit will be obtained and complied with.
- Stormwater will be treated to WSDOT Level C standards.
- Ground disturbance near streams or riparian areas will be minimized by limiting equipment travel and disturbance using "construction envelopes" (areas where equipment is not allowed are marked off with stakes and ribbon).
- If equipment or materials need to be stored temporarily near a construction area, they will be placed on the existing ground surface without removing vegetation. Crushing vegetation is preferable to removing it.

- Revegetation of disturbed sites with native vegetation appropriate to the site will occur as soon as possible after construction is complete (during appropriate fall or spring planting season).

- Special containment measures will be employed in staging areas located within 90 m (300 ft) of the OHWM of the north tributary or East Fork Issaquah Creek.

- All exposed fill slopes will be seeded and mulched according to WSDOT standard specifications and all disturbed ground will be restored to pre-project grade and seeded and mulched.

- Construction-related water quality impacts will be minimized or avoided through the development and implementation of a Pollution Control Plan (PCP) and an Erosion and Sediment Control Plan (ESCP).

7.2.2 Stream Channel and Fish

The following minimization and avoidance measures will be implemented to minimize changes in stream flow from stormwater runoff:

- Stormwater treatment facilities will maintain peak flows and flood flow duration at pre-project development conditions.

- In compliance with City of Issaquah and King County requirements permanent stormwater treatment and retention/detention facilities will be installed to reduce the adverse impacts of drainage from all of the new project roadways on nearby wells, surface water, and existing drainage systems. The proposed infiltration facilities for the northern half of the Southeast Issaquah Bypass will completely mitigate the potential hydrologic impacts of proposed project on the groundwater aquifer and on East Fork Issaquah Creek and constructed drainage systems in the neighborhood west of the proposed project roadway corridor. The proposed detention facilities for the southern half of the Southeast Issaquah Bypass will mitigate the potential substantial adverse impacts of the project on the north tributary to Issaquah Creek.

- To offset potential adverse impacts on flow conditions in the north tributary resulting from uncontrolled stormwater discharges, woody debris could be installed in the north tributary stream channel to enhance flow attenuation upstream of Front Street South.

- To increase the amount of site runoff that infiltrates the ground, thereby adding to groundwater recharge and reducing effects on the north tributary, the project design will seek to incorporate porous pavement in selected areas. For example, new trailhead parking areas could be paved with porous materials.

The following minimization and avoidance measures will be implemented to minimize changes in thermal regimes and large woody debris recruitment patterns from riparian vegetation clearing along the right-of-way:

- Trees in riparian areas that must be felled will be left within the riparian area or stream as downed woody debris for fish and wildlife habitat. Small trees and shrubs (<8 ft tall) will be left where possible. Replacement riparian trees and shrubs will be planted where appropriate near where riparian vegetation has been removed to provide a functional equivalent of the vegetation removed.

The following minimization and avoidance measures will be implemented to minimize mechanical disturbance to fish and fish habitat from construction of the road.

- No work within the active channel will be conducted.
- Materials that have been blasted or otherwise introduced into a stream or wetland as a result of road construction will be manually removed so as not to alter stream flow or wetland hydrology (if doing so will not result in disturbance to the channel, bank, or riparian area).

The following minimization and avoidance measures will be implemented to minimize disturbance, injury or mortality to fish from blasting, pile driving or other high intensity vibrations.

- If blasting, pile driving, or other action producing high-intensity vibrations or shock waves is required within 30 m (100 ft) of a fish-bearing stream, it will only be conducted during the WDFW-approved work window (July 1 - September 15) for protection of eggs and alevins. If pile driving is required within 30 m (100 ft) of a stream, it will follow procedures outlined in NOAA Fisheries Standard Local Operating Procedures for Endangered Species (SLOPES) Biological Opinion (dated July 8, 2003).

7.2.3 Wetland/Riparian Areas and Wildlife Habitat

The following minimization and avoidance measures will be implemented to minimize disturbance to wetland and riparian areas and wildlife habitat:

- The amount of vegetation cleared to complete this project shall be kept to the least possible amount to achieve the construction goals. Construction equipment and staging areas will be limited by the use of construction envelopes (flagging areas where equipment must stay out of.
- A wetland and riparian area site restoration plan for the proposed project has been developed to enhance riparian function within the immediate project vicinity and mitigate impacts to wetlands and the riparian areas of the north tributary and East Fork Issaquah Creek.
- Should wintering bald eagles be observed attempting to use the project area or adjacent sites for feeding or roosting, construction during the winter (November 15-March 15) will be limited to daylight hours.

7.3 IMPACTS TO ISSAQUAH CREEK WATERSHED ENVIRONMENTAL BASELINE

Evaluation for potential impacts of this proposed action on the Issaquah Creek watershed and listed fish species was conducted according to *Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale* (NOAA Fisheries, 1996). The effects of the proposed project on the watershed's environmental baseline are evaluated below. Baseline conditions in the Issaquah Creek watershed and the effects of the proposed project are summarized in the checklist for documenting environmental baseline and effects of proposed actions on relevant indicators for the Puget Sound ESU chinook salmon, Puget Sound DPS bull trout and Puget Sound ESU coho salmon (should they become listed as threatened or endangered) in the Issaquah Creek watershed (Table 8).

Table 8. Checklist for Documenting Environmental Baseline and Effects of Proposed Actions

	ENVIRONMENTAL BASELINE[1]			EFFECTS OF THE ACTION(S)[2]		
PATHWAYS: Indicators	**Properly Functioning**	**At Risk**	**Not Properly Functioning**	**Restore**	**Maintain**	**Degrade**
WATER QUALITY:						
Temperature			X		X-	
Sediment/Turbidity			X		X-	
Chemical Contamination			X		X	
HABITAT ACCESS:						
Physical Barriers		X			X	
HABITAT ELEMENTS:						
Substrate		X			X	
Large Woody Debris			X		X-	
Pool Frequency			X		X	
Pool Quality			X		X	
Off-Channel Habitat			X		X	
Refugia			X		X	
CHANNEL CONDITION AND DYNAMICS:						
Width/Depth Ratio		X			X	
Streambank Condition		X			X-	
Floodplain Connectivity			X		X	
FLOW/HYDROLOGY:						
Peak/Base Flows			X		X	
Drainage Network Increase			X		X-	
WATERSHED CONDITIONS:						
Road Density & Location			X			X
Disturbance History			X		X-	
Riparian Reserves			X		X-	

Notes:

(1) Impacts at a local level but not sufficient to alter the environmental baseline for the watershed are indicated using a "(-)" for temporary or localized impacts or "(+)" for temporary or localized beneficial alterations.

(2) Conditions within the action area, that are different from the project watershed, are indicated using a lower case "x".

NOAA Fisheries defines properly functioning condition (PFC) as the sustained presence of natural habitat-forming processes (e.g., bedload transport, channel migration, riparian vegetation succession) that are necessary for the long-term survival and recovery of the species (NOAA Fisheries, 1999). Thus, PFC constitutes habitat-based biological requirements of the species: the essential physical features that support spawning, incubation, rearing, feeding, sheltering, migration, and other behaviors. Such features include adequate in-stream flow, appropriate water temperature, loose gravel for spawning, unimpeded fish passage, deep pools, and abundant large tree trunks and root wads.

7.3.1 Water Quality

7.3.1.1 Temperature:

Issaquah Creek is on the 303(d) list for temperature downstream of the project area at the Issaquah Fish Hatchery (the environmental baseline assessment is **"not properly functioning"**, as shown in the Table 8 checklist). High water temperatures generally only occur in late summer/early fall when fall chinook enter and spawn in Issaquah Creek, putting them at risk. Within the project area, temperature data are not available for the East Fork Issaquah Creek and the north tributary. Although temperature data do not exist for the north tributary within the project area, the stream is spring fed and flows through an area of dense vegetation upstream of the project area, therefore the water temperature is not likely to exceed water quality standards. The proposed project will result in the removal of approximately 20 trees from the riparian area of the north tributary. Most of these trees are far enough away from the north tributary to provide minimal stream shading; however, some slight temperatures increases in the north tributary should be expected until the replacement plantings mature (the effect of the action is to **maintain,** as shown in the Table 8 checklist).

7.3.1.2 Sediment

Issaquah Creek and East Fork Issaquah Creek naturally have relatively high sediment loads (Parametrix, 2002). Through changes in storm runoff patterns and loss of pervious surfaces in the both the lower and upper watershed, sediment loads are increasing. The confined stream channel has lost much of its ability to meander and create natural sorting and depositional processes, and spawning gravels exhibit some embeddedness (Parametrix, 2002). Within the project area, the north tributary is a very small stream dominated by fine sediments (Herrera and Associates, 1998a). The gradient and flow are low enough that the high silt and sand content is a natural condition, however this is only a small part of the action area. Overall the Issaquah Creek watershed including the action area is **not properly functioning** (as shown in Table 8) for sediments. The project includes the development and implementation of an Erosion and Sediment Control Plan. Temporary localized impacts are possible through execution of in-water work; however, given the proposed conservation measures and implementation of an Erosion and Sediment Control Plan the proposed project is not expected to affect this parameter on a watershed scale (**maintain**–see Table 8).

7.3.1.3 Chemical Contamination

Issaquah Creek is on the 303(d) list for fecal coliform and the City of Issaquah (2000) indicates that the East Fork Issaquah Creek also exceeds water quality standards for fecal coliform. Six percent of pH measurements between 1991 and 1997 were beyond the upper criterion, although this was below the threshold for a 303(d) listing. Issaquah Creek also has high concentration of suspended sediments, nitrate and nitrite, and total phosphorous during storm events (Parametrix, 2002). The Issaquah Creek watershed and the action area are **not properly functioning** (as shown in Table 8) for chemical contamination.

There is a potential for accidental chemical contamination of the north tributary or the East Fork of Issaquah Creek from leaks or spills of hazardous fluids (petroleum, oil, and lubricants) from vehicles or equipment operating in the project area. Release of hazardous materials has the potential to affect fish health and behavior, and the availability of invertebrate prey communities. To minimize the potential for chemical contamination, conservation measures will be employed to prevent, to the extent possible, leaking equipment and spills from transfer of hazardous materials. Containment materials will be kept on-site in case of a spill. These materials will be used to minimize entry of a spill into the stream and to facilitate cleanup, removal, and proper disposal of spilled material from the project site (Section 7.1) (**maintain**–see Table 8).

7.3.2 Habitat Access

7.3.2.1 Physical Barriers

The Issaquah salmon hatchery on Issaquah Creek has a weir, but some fish are able to pass over it during high flows (Parametrix, 2002). Excess coho and chinook and all other species are passed above the weir and allowed to spawn naturally. The hatchery intake diversion dam upstream of the hatchery on Issaquah Creek acts as a partial barrier at some flows. No barriers exist on the East Fork Issaquah Creek. The north tributary has a small dam just above the culvert under Front Street South that appears to act as a barrier. Overall, the Issaquah Creek watershed and the action area are functioning **at risk** (as shown in Table 8) for physical barriers. The proposed project will not involve work within the channel or other work that will affect channel processes, nor will it create or eliminate physical barriers (**maintain**–see Table 8).

7.3.3 Habitat Elements

7.3.3.1 Substrate

Average substrate size in Issaquah Creek ranges from 19 to 36 mm (0.75 to 1.41 in) with percentage of fines ranging from 0 to 29 percent (mostly averaging 8-10 percent). Embeddedness over much of Issaquah Creek is 20 to 40 percent (Parametrix, 2002). East Fork Issaquah Creek substrate is also highly embedded cobble and large gravel (Parametrix, 2002). The north tributary does not have spawning gravels, and all of the substrate is silt or sand (Herrera and Associates, 1998a) The Issaquah Creek watershed including the action area is currently functioning **at risk** (as shown in Table 8) for substrate conditions. No work within the channel will occur and conservation measures to limit erosion and sedimentation of the north tributary and East Fork Issaquah Creek will be in place to eliminate the potential for substrate embeddedness (**maintain**–see Table 8).

7.3.3.2 Large Wood

Existing LWD (large woody debris) is absent in most reaches with only one key piece in the entire mainstem of Issaquah Creek and none in East Fork Issaquah Creek (Parametrix, 2002). LWD recruitment potential is moderate to low for most reaches. LWD frequency is slightly better in the north tributary, but still poor, due to a lack of large riparian trees near the channel (Herrera and Associates, 1998a). Within the action area and the Issaquah Creek watershed, the large wood parameter is **not properly functioning,** as shown in Table 8. The proposed project involves the removal of trees that could constitute a potential large woody debris source to the north tributary (**maintain**–see Table 8).

7.3.3.3 Pool Frequency

Pool frequency in Issaquah Creek and East Fork Issaquah Creek is limited due to channelization and lack of LWD (Parametrix, 2002), making this parameter **not properly functioning**, as shown in Table 8. Pool frequency in the north tributary is also poor (Herrera and Associates, 1998a). The proposed project does not involve work within the channel; however the removal of LWD can affect pool frequency. The few riparian trees to be removed from the north bank of the north tributary will be placed within the active channel to maintain the amount of LWD, therefore the project is not expected degrade existing pool frequency within the Issaquah Creek watershed (**maintain**–see Table 8).

7.3.3.4 Pool Quality

Functional pools are almost nonexistent in Issaquah Creek and East Fork Issaquah Creek due to shallow depths and filling with sediments (Parametrix, 2002). Likewise, pool quality in the few pools in the north tributary is poor, with little rearing habitat present (Herrera and Associates, 1998a). Pool quality is **not properly functioning** (as shown in Table 8) within the Issaquah Creek watershed and the action area.

Changes in pool quality will be unlikely as a result of the proposed action. The only potential impact to pool quality resulting from the proposed project will be sediment inputs into the north tributary or East Fork Issaquah Creek. Appropriate stormwater treatment and erosion control will limit the potential for sediment transport and in-filling of pools (**maintain**–see Table 8).

7.3.3.5 Off-Channel Habitat

Due to channelization, and floodplain encroachment there is little room for off-channel habitat forming processes in Issaquah Creek or East Fork Issaquah Creek. Only six side channels were identified within Issaquah Creek and three of those were created in the lowest reaches of the stream during restoration efforts (Parametrix, 2002). Some of the more protected small tributaries such as the north tributary could provide refugia from storm flows similar to that provided by side channels; however, overall this habitat parameter is **not properly functioning,** as shown in Table 8. Given the generally upland location and type of proposed activities, no changes in off-channel habitat will be expected to occur as a result of the proposed action (**maintain**–see Table 8).

7.3.3.6. Refugia

Refugia are limited within the mainstem of Issaquah Creek and the lower reaches of its tributaries by lack of LWD, poor quality and low frequency of pool habitat, little off channel habitat, and confined stream channels. More refugia are present upstream of the project area in the upper Issaquah Creek watershed and various tributaries. Portions of the habitat refugia exist within the watershed but are not well buffered; the riparian system is thin and patchy because of the adjacent land uses throughout the basin. The refugia that do exist are insufficient in size, number, and connectivity. Within the project area, the lower reach of the north tributary may act as refugia from high flows in Issaquah Creek. Overall the refugia habitat parameter is **not properly functioning** (as shown in Table 8) for the Issaquah Creek watershed and the action area.

No changes in refugia or excessive alteration of Issaquah Creek's floodplain are expected to occur as a result of the proposed action (**maintain**–see Table 8). The potential for natural development of habitat refugia in the lower reaches of Issaquah Creek is limited by the presence of urban development in the greater Issaquah area.

7.3.4 Channel Conditions and Dynamics

7.3.4.1 Width/Depth Ratio

Based on field observations, Issaquah Creek near the project area has a moderate to high width/depth ratio. The channel is generally wide and shallow with a fairly uniform bottom. The upper reaches of the watershed are higher gradient and moderately constrained. Therefore, the width/depth ratio is likely to be properly functioning in those portions of the watershed. Overall the Issaquah Creek watershed is **at risk** (as shown in Table 8) for this habitat parameter.

Because no in-water work will occur, and only a small area of streambank will be affected in East Fork Issaquah Creek and the north tributary (which is likely properly functioning) no changes in width/depth ratio will be expected to occur within the overall Issaquah Creek watershed as a result of the proposed action (**maintain**–see Table 8).

7.3.4.2 Streambank Condition

The north tributary within and upstream of the project area has very stable banks due to the small size of the stream and the dense wetland vegetation that stabilizes the stream banks. Streambank stability in the lower reaches of Issaquah Creek and East Fork Issaquah Creek is generally high although several significant areas of bank erosion exist (Parametrix, 2002). However, approximately 20 to 50 percent of the streambanks in Issaquah Creek and East Fork Issaquah Creek are armored or otherwise modified, putting this habitat parameter **at risk** (as shown in Table 8). Vegetation removal and ground disturbance associated with the proposed project will occur far enough away from the bank of the north tributary to not have any direct effects. Riparian vegetation removed by project construction will be replanted to help stabilize the north tributary stream banks. The stormwater outfall along the East Fork Issaquah Creek will create a small hard point just above the OHWM, but overall the project will not contribute to significantly degraded streambank conditions (**maintain**–see Table 8).

7.3.4.3 Floodplain Connectivity

Within the action area the north tributary is well connected to the wetland area, which serves as a floodplain (Herrera and Associates, 1998a). However, floodplain connectivity is considered to be **not properly functioning** (as shown in Table 8) within the action area and the Issaquah Creek watershed due to high levels of development in the floodplain, channelization, incision, and lack of LWD (Parametrix, 2002). Based on the actions proposed, no changes in floodplain connectivity are expected to occur as a result of the proposed action (**maintain**–see Table 8).

7.3.5 Flow/Hydrology

7.3.5.1 Peak/Base Flows

Although East Fork Issaquah Creek and the north tributary have less intensive development in their watersheds, the mainstem of Issaquah Creek has been affected by the creation of impervious surfaces from urbanization, vegetation removal and other disturbances. Currently, base flows are below historical levels and show continued downward trends, while annual peak flows show an increase in magnitude (Parametrix, 2002). The City of Issaquah (2000) estimated that urbanization accounts for an approximately 8 percent increase in the magnitude of the 100-year flood event over pre-development conditions. The Issaquah Creek watershed and the action area are **not properly functioning** (as shown in Table 8) for this parameter.

In compliance with City of Issaquah and King County requirements permanent stormwater treatment and treatment/detention/infiltration facilities will be installed to reduce the adverse impacts of stormwater runoff from all of the new project roadways on nearby wells, surface water, and existing drainage systems. The stormwater infiltration facilities in the north half of the project will mitigate the potential hydrologic impacts of the project on the groundwater aquifer and on East Fork Issaquah Creek while the proposed detention facilities in the south half of the project will ensure that stormwater runoff matches pre-development conditions and minimizes potential peak flow impacts to the north tributary (**maintain**–see Table 8).

7.3.5.2 Drainage Network Increase

Roads and other human disturbances are common in the lower Issaquah Creek watershed and in the middle part of the mainstem; agriculture has created some diversion and channelization of small tributaries, leading to drainage network increases (**not properly functioning**–see Table 8). Runoff from all impervious surface associated with this project will be directed to the stormwater treatment and infiltration system, which will mitigate the potential adverse effects to surface water flows and groundwater recharge, thereby effectively limiting increases to existing drainage networks (**maintain**–see Table 8).

7.3.6 Watershed Conditions

7.3.6.1 Road Density and Location

Road density is extremely high in the lowest reaches of Issaquah Creek and its tributaries due to urbanization in the City of Issaquah (**not properly functioning**–see Table 8). In the middle of the system, where the land use is rural and agricultural, road density is moderate. In the highest reaches of Issaquah Creek and its tributaries road density is low. Technically, the addition of the Southeast Issaquah Bypass road represents new road construction in an area where none existed before (**degrade**–see Table 8). However, the location of the road in an upland area, and the treatment and infiltration of the stormwater from the road will effectively represent only a minor increase in road density within the watershed and should result in only minor to negligible localized changes to the environmental baseline.

7.3.6.2 Disturbance History

Urbanization, timber harvest and other human disturbances have caused degradation of most stream health parameters in the Issaquah Creek watershed over the past 100 years (**not properly functioning**–see Table 8). Generally the upstream reaches within the system are in better condition than the lowest reaches. The level of disturbance associated with the proposed project will not add to the overall disturbance history of the Issaquah Creek watershed on a local level (**maintain**–see Table 8).

7.3.6.3 Riparian Reserves

Riparian areas upstream of the project area and in headwater tributaries are generally recovering from historic timber harvesting; however, stream incision has reduced available riparian areas, and roads and road grades continue to disrupt the connectivity of the riparian areas and constrict floodplain development. In the lower reaches of Issaquah Creek and its tributaries the riparian areas are heavily disturbed by urbanization and channelization (**not properly functioning**–see Table 8). The proposed project will remove approximately 20 riparian trees and disturb approximately 0.2 ha (0.5 ac) of riparian area. However, the removal of this small amount of riparian area represents a small fraction of the available riparian reserves and could not significantly alter the environmental baseline for LWD recruitment, stream shading or habitat within the Issaquah Creek watershed (**maintain**–see Table 8).

7.4 EFFECTS TO CRITICAL HABITAT

As described in Section 5.1, critical habitat for the Puget Sound chinook salmon was designated in 2000 (65 FR 7773), but withdrawn in response to litigation challenging the process by which NOAA Fisheries establishes critical habitat. Currently, critical habitat for the Puget Sound chinook salmon is not designated. However, NOAA Fisheries expects to designate critical habitat for Puget Sound chinook salmon within the next year. Critical habitat has not been designated for bull trout. Critical habitat for Puget Sound coho salmon has not been designated because the species is a candidate for listing and is not yet listed. This section addresses the expected impacts of the project on essential features of critical habitat should critical habitat be designated within the project area.

NOAA Fisheries has identified five essential habitat types that compose salmon and steelhead critical habitat, including 1) juvenile rearing areas, 2) juvenile migration corridors, 3) areas for growth and development to adulthood, 4) adult migration corridors, and 5) spawning areas. NOAA Fisheries has also developed ten essential features of critical habitat that occur within each of the five essential habitat types. These essential features of critical habitat include 1) substrate, 2) water quality, 3) water quantity, 4) water temperature, 5) water velocity, 6) cover/shelter, 7) food, 8) riparian vegetation, 9) space, and 10) safe passage conditions.

Stream reaches within the Southeast Issaquah Bypass project area provide juvenile rearing areas and spawning areas for Puget Sound chinook salmon and Puget Sound coho salmon. The potential effect of the proposed project on the essential features of juvenile rearing areas and spawning areas are described below.

7.4.1 Substrate/Water Quality

With TESC measures fully implemented and stormwater treated to WSDOT Level C there should be no sediment input or hazardous materials entering the stream from the project area above background conditions. Therefore, no adverse effect upon this essential feature of designated critical habitat will occur (should critical habitat be designated within the project area).

7.4.2 Water Quantity

Stormwater treatment facilities in the north half of the project area have been designed to infiltrate water after treatment to maintain groundwater levels and to treat water to maintain peak and flood flows at predevelopment conditions. Stormwater facilities in the south half of the project are designed to release flows into the north tributary and Wetland GW at predevelopment conditions, which will continue to allow infiltration and groundwater recharge to occur. Therefore, no adverse effect upon this essential feature of designated critical habitat will occur (should critical habitat be designated within the project area).

7.4.3 Water Temperature

The proposed project will remove some riparian vegetation near the north tributary, but smaller trees and shrubs will be left to provide continued stream shading. Some loss of shading will occur and may raise the water temperature slightly. However, the effect will most likely not be measurable and will only be temporary until replacement vegetation matured. Therefore only a minor temporary adverse effect upon this essential feature of designated critical habitat will occur (should critical habitat be designated within the project area).

7.4.4 Water Velocity

Puget Sound chinook are not expected to experience changes in water velocity as a result of the project because stormwater systems will be designed to maintain pre-project development stream flow conditions and to infiltrate most of the stormwater runoff. Therefore, no adverse effect upon this essential feature of designated critical habitat will occur (should critical habitat be designated within the project area).

7.4.5 Cover/Shelter/Food/Riparian Vegetation/Space

Removal of riparian trees along the north tributary could reduce overhanging branches that provide fish protection from raptors and other predators and remove sources of LWD that fish use as cover. However, riparian trees and shrubs will be replanted close to where they were removed to provide shade and cover near banks, and a future source of LWD. Large trees that need to be removed from the project area will be left within the stream channel or riparian area to maintain LWD sources. With these measures in place, removal of trees will have only a temporary negligible effect on fish cover and shelter and LWD recruitment patterns within the project area. Therefore, only minor adverse effects upon this essential feature of designated critical habitat are expected to occur (should critical habitat be designated within the project area).

7.4.6 Safe Passage Conditions

No changes to existing passage conditions are planned. Therefore, no adverse effect upon this essential feature of designated critical habitat will occur (should critical habitat be designated within the project area).

7.4.7 Summary

When assessing whether an adverse effect to designated critical habitat is likely to occur, it is reasonable to consider the range of the critical habitat types affected by the proposed action, the geographic scope of the effects, and the degree to which the effects are likely to limit the productivity of each ESU. The proposed project will only directly affect an extremely small area East Fork of Issaquah Creek and of the north tributary which may not even be used by fish) and virtually all other fish habitat within the project area will be marginally affected, if at all. Even when added to the existing not properly functioning environmental baseline conditions of the stream systems, these effects are not of sufficient magnitude to result in substantial adverse effects throughout the species range, or to appreciably diminish the value of the critical habitat for both the survival and the recovery of the Puget Sound chinook salmon. Therefore, the City of Issaquah concludes that even if critical habitat were designated within the project area, no adverse modifications to designated critical habitat will occur as a result of the proposed project.

8.0 INDIRECT EFFECTS

Indirect effects are effects to species that occur later in time after a project has been built and separate from the direct effects of the construction and operation of a facility. The proposed project represents a new road in an area that does not currently have one. In some instances the construction of new roads leads to more development (called induced development). The potential for induced development along the proposed road is relatively low because there is not much land suitable for development on either side of it, and because the land that is undeveloped is currently zoned for low-density uses. Most of the King County land use zoning designation surrounding the proposed project is Forest Lands with several small areas zoned rural residential with one dwelling unit allowed for every 10 acres. Lands within the City of Issaquah are mostly zoned for Community Facilities (currently used as school grounds). Developed areas in the south of the project are zoned Single Family Residence with a maximum of 4.5 dwelling units per acre.

It is also difficult to differentiate between development in the area that is "induced' by the proposed project or would occur without the proposed project being constructed. The area currently has access points from the existing City of Issaquah road system that could facilitate new development. Several access points are planned as part of the project. An intersection in the middle of the project will provide access to the Park Pointe Development. A smaller intersection to the south of the main Park Pointe intersection will provide secondary access to Park Pointe. A third small intersection (of the northbound lanes only) will provide access to a small trailhead parking area. The proposed project may actually limit the existing access to areas that are suitable for development because it is intended to be a major thoroughfare with few intersections.

Future development resulting from construction of the SE Bypass project would have to meet stormwater management guidelines and other resource protection rules similar to the proposed project. Some adverse impacts to fish species should be expected. Future development may also remove some of the potential bald eagle perching and roosting habitat, although this habitat is currently unoccupied.

The Park Pointe Development is not considered to be induced development, because it is planned to occur independently of the proposed project (Parke Pointe is addressed in Section 10.0 Cumulative Effects).

9.0 INTERRELATED AND INTERDEPENDENT EFFECTS

Interrelated actions include actions that are part of a larger action and depend on the larger action for justification. Interdependent actions are defined as actions with no independent utility apart from the proposed action. The proposed Southeast Issaquah Bypass has one interrelated action, which will be the implementation of the proposed site restoration plan. No interdependent actions associated with this development have been identified. The proposed Park Pointe Development, if developed after the proposed project, will likely connect to the Southeast Bypass road. However, the proposed Park Pointe Development is not dependent upon the Southeast Bypass Road being constructed, since the main access road could connect to an existing city street, therefore it is not considered to be an interrelated or interdependent effect (however it is considered under the cumulative effects section below).

10.0 CUMULATIVE EFFECTS

Cumulative effects are defined as the effects of future state, local, or private activities that are reasonably certain to occur in the project action area. Urban and recreational land uses within the action area are anticipated to continue into the foreseeable future. Additional road development is also likely in the foreseeable future in the action area. However, the only specific development that is currently in the planning stage is the Park Pointe Development that will occur on private property to the east of the proposed Southeast Bypass alignment.

The planned development would include 41.3 ha (102 ac) of residential and commercial uses. Although not approved at this time, full buildout, as currently designed, could include up to 660 residential units, 15,236 m^2 (164,000 ft^2) of office space, and 557 m^2 (25,000 ft^2) of retail space. Presently the property is undeveloped, environmental review is not complete, and permits for the proposed project have not yet been issued by the City of Issaquah.

The plans for the most intensive alternative of the Park Pointe development would include a total developed area of approximately 17.8 ha (44.0 ac), with approximately 9.3 ha (23.0 ac) of impervious area and approximately 8.5 ha (21.0 ac) of pervious surfaces. The stormwater treatment for the proposed project would include dry wells, an infiltration trench, an infiltration pond, and a wet pond/bioswale treatment system. Most of the water from the site would be conveyed to the wet pond followed by the infiltration pond, while some water from rooftops would be sent to drywells. Overflow from the infiltration pond would be enter the bypass conveyance system and empty to a dispersion trench that would discharge as sheet flow to wetland GW. The system is designed to infiltrate all flows up to the 100-year storm event.

Assuming that the stormwater treatment from the proposed project and the Park Pointe Development could be managed as planned, the impacts to peak and base flows to the Issaquah Creek drainage would likely not be measurable. However, the addition of roads and removal of upland habitat would cause additional impacts to some baseline indicators for chinook salmon, coho and bull trout, and may encroach on bald eagle wintering habitat in the Tradition Lake area east of the project site.

11.0 CONSERVATION GOALS

A Site Restoration Plan will be prepared for the proposed project. The plan will include grading and planting activities that will improve the disturbed buffer areas around wetlands HS and GW, improve the riparian area of the north tributary, mitigate for impacts to Wetland HS and improve fish habitat.

The project will permanently impact approximately 0.06 ha (0.16 ac) of wetlands and 0.62 ha (1.54 ac) of wetland buffer areas. The project will temporarily impact 0.19 ha (0.47 ac) of wetland buffer (no wetland areas will be temporarily impacted).

To mitigate for the permanent loss of wetlands, an area approximately 0.12 ha (0.32 ac) and adjacent to wetland GW will be converted from upland to wetland by excavation of non-hydric soils and planting of wetland plant species. This wetland will provide functions such as flood storage capacity for Issaquah Creek, water quality improvement by biofiltration and nutrient uptake, stormwater attenuation from increases in floodplain roughness, and increases in ground water infiltration.

To mitigate for the loss and disturbance to wetland buffers, three buffer enhancement sites totaling approximately 0.59 ha (1.45 ac) will be selected to improve the condition of the wetland buffer area. These three sites will be purchased to ensure that they remain as open space, non-native species will be cleared from them, topsoil added, and native trees shrubs and herbaceous species planted. These buffers will help to protect the functions and quality of wetlands HS and GW by filtering stormwater, shading streams and wetlands, and providing wildlife habitat.

To mitigate for potential impacts to listed fish species, an off channel pond would be enhanced at Buffer Mitigation Site No. 2. An existing pond would be connected to the north tributary by a channel, riparian vegetation planted around the pond, and large woody debris placed into the pond to provide cover. This project would especially benefit coho salmon, which prefer to rear in off-channel habitats with lots of cover. Large woody debris from removal of trees within the construction area would also be placed within the channel of the north tributary to provide structural complexity, which will help to create fish habitat.

12.0 DETERMINATION OF EFFECT

12.1 REVIEW OF EFFECTS

The Issaquah Creek watershed has been highly impacted by development pressure, both historical and current. The proposed project is unlikely to alter the environmental baseline conditions of the entire Issaquah Creek watershed. However, several small-scale local impacts are anticipated. These impacts include minor and temporary increases in temperature and sediment, minor and temporary reduction in LWD recruitment potential, slight changes to streambank conditions, and minor and localized increases in drainage networks, road density, disturbance history and riparian reserves. Conservation measures included during project construction will greatly reduce the scale of potential impacts.

The actions proposed in this BA have a negligible likelihood of resulting in incidental take of Puget Sound chinook salmon and Puget Sound bull trout or bald eagles. No in water work will be conducted as part of the proposed project, therefore, quantifying incidental take resulting from project actions is not possible.

Federally listed species of concern do not have legal protection under the ESA, thus there is no formal effects determination made for them here. WSDOT guidance requests that potential impacts to federal species of concern be addressed in the BA. This discussion can be found in Section 14.0.

12.2 NOAA FISHERIES LISTED SPECIES

12.2.1 Chinook Salmon

Following analysis of the possible impacts that may result from the proposed action, the City of Issaquah believes that the proposed project **may affect, and is likely to adversely affect** the Puget Sound chinook salmon ESU. The proposed action will slightly impact several of the baseline indicators for this species. Generally these impacts will be temporary, such as the removal of several riparian trees and the risk of sediment and pollution inputs to streams during construction. Other impacts are mitigated for, such as the proposed treatment of stormwater negating the impacts to the drainage network increase baseline indicator. However, changes to the streambank condition, road density and location and disturbance history baseline indicators may result in localized permanent impacts.

Impacts to formerly listed critical habitat as a result of the proposed project may occur at a local level, but will not be enough to affect critical habitat throughout the species range. If critical habitat for the Puget Sound chinook salmon ESU becomes designated during the life of the proposed action and is similar to the previous critical habitat designation, a determination of **may affect, not likely to adversely modify** critical habitat will be made for this ESU.

Due to this finding of effect, the City of Issaquah is requesting initiation of **formal consultation** with NOAA Fisheries in accordance with Section 7 of the ESA.

12.2.2 Coho Salmon

Although some baseline indicators will be impacted as described in Section 11.2.1, the impacts will be limited to a small part of the Issaquah Creek watershed that in turn encompasses only a small part of the Puget Sound coho salmon ESU. Because the impacts are likely to be minor and localized, the proposed project **is not likely to jeopardize the continued existence of the species** and is **not likely to contribute to the need to list the species.**

12.3 USFWS LISTED SPECIES

12.3.1 Bull Trout

Following analysis of the possible impacts that may result from the proposed action, the City of Issaquah believes that the proposed project **may affect, and is likely to adversely affect** the Puget Sound bull trout DPS. The proposed action will slightly impact several of the baseline indicators for this species. Generally these impacts will be temporary, such as the removal of several riparian trees and the risk of sediment and pollution inputs to streams during construction. Other impacts are mitigated for, such as the proposed treatment of stormwater negating the impacts to the drainage network increase baseline indicator. However, changes to the streambank condition, road density and location and disturbance history baseline indicators may result in localized permanent impacts.

No critical habitat has been designated for the Puget Sound bull trout DPS, therefore the proposed project will have **no effect** on bull trout critical habitat.

Due to this finding of effect, the City of Issaquah is requesting initiation of **formal consultation** with USFWS in accordance with Section 7 of the ESA.

12.3.2 Bald Eagle

No documented habitat for nesting bald eagles exists within 1.6 km (1 mi) of the proposed project area. Suitable wintering habitat exists approximately 1.6 km (1 mi) north and east of the proposed project on Lake Sammamish and Tradition Lake. An occasional migrating or resident bald eagle may be present at times over the project area. A number of trees will be removed; however, no large, mature trees with large branches and complex structure that bald eagles prefer for roosting and perching are present in the project area or will be removed. The lack of open water and large trees within the project area limits nesting, perching and roosting areas. Temporary disturbance to bald eagles may result from construction-related noise or human activity Should wintering eagles be observed using the project area or adjacent sites for feeding or roosting, construction during the winter (November 15-March 15) will be limited to daylight hours. Operation of the project (vehicle use) is not expected to affect eagle use in the area, because existing eagle use is limited and existing disturbance from traffic and other human activity is high. The project may cause slight changes to water quality and stream flow, leading to a decline in some fish prey species in Issaquah Creek a potential indirect effect to bald eagles. However, since eagles generally do not use Issaquah Creek, and because they have other forage areas and food sources, indirect effects to them are expected to be negligible. The proposed project will comply with the recovery tasks for bald eagles as described in the Pacific States Bald Eagle Recovery Plan, specifically Recovery Goal 1.33 Restrict Human Disturbance At Eagle Use Areas (USFWS, 1986). The proposed project **"may affect, but is not likely to adversely affect"** the bald eagle.

13.0 ESSENTIAL FISH HABITAT CONSULTATION

13.1 OVERVIEW OF ESSENTIAL FISH HABITAT

The MSA established procedures designed to identify, conserve, and enhance EFH for those species regulated under a Federal fisheries management plan. The MSA requires Federal agencies to consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (MSA Section 305(b)(2)).

Adverse effect means any impact that reduces quality and/or quantity of EFH, and may include direct (i.e., contamination or physical disruption), indirect (i.e., loss of prey or reduction in species fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810).

EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA Section 3). For the purpose of interpreting this definition of EFH: "waters" include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; "substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities; "necessary" means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 CFR 600.110).

Consultation under Section 305(b) of the MSA (16 U.S.C. 1855(b)) requires that:

1. Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH;

2. NOAA Fisheries shall provide conservation recommendations for any Federal or state activity that may adversely affect EFH;

3. Federal agencies shall, within 30 days after receiving conservation recommendations from NOAA Fisheries, provide a detailed response in writing to NOAA Fisheries regarding the conservation recommendations. The response shall include a description of measures proposed by the agency for avoiding, mitigating or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the conservation recommendations of NOAA Fisheries, the Federal agency shall explain its reasons for not following the recommendations.

The MSA requires consultation for all actions that may adversely affect EFH, and does not distinguish between actions within EFH and actions outside EFH. Any reasonable attempt to encourage the conservation of EFH must take into account actions that occur outside EFH, such as upstream and upslope activities, which may have an adverse effect on EFH. Therefore, EFH consultation with NOAA Fisheries is required by Federal agencies undertaking, permitting, or funding activities that my adversely affect EFH, regardless of its location.

13.2 IDENTIFICATION OF ESSENTIAL FISH HABITAT

EFH for the Pacific Coast Salmon fishery means those waters and substrate necessary for salmon production needed to support a long-term sustainable fishery and salmon contributions to a healthy ecosystem (i.e., properly functioning habitat conditions necessary for the long-term survival of the species through the full range of environmental variation). To achieve that level of production, EFH must include all those streams, lakes, ponds, wetlands, and other currently viable water bodies and most of the habitat historically accessible to salmon in Washington, Oregon, Idaho, and California, except above the impassable barriers identified by Pacific Fisheries Management Council (PFMC, 1999). Chief Joseph Dam, Dworshak Dam, and the Hells Canyon Complex (Hells Canyon, Oxbow, and Brownlee Dams) are among the listed man-made barriers that represent the upstream extent of the Pacific coast salmon fishery EFH. Salmon EFH excludes areas upstream of longstanding naturally impassable barriers (i.e., natural waterfalls in existence for several hundred years). In the estuarine and marine areas, salmon EFH extends from the nearshore and tidal submerged environments within state territorial waters out to the full extent of the exclusive economic zone (370.4 km [230.2 mi]) offshore of Washington, Oregon, and California north of Point Conception (PFMC, 1999).

13.3 CONCLUSION

13.3.1 Effects to Pacific Salmon EFH

The impact minimization and avoidance measures described in this BA (Section 7.2) are considered adequate to minimize most adverse effects on EFH for Pacific Salmon in this project. However, the City of Issaquah believes that the proposed action **will adversely affect** Pacific Salmon EFH. There will be localized disturbance to several baseline indicators from removal of riparian vegetation, streambank disturbance, potential sediment and pollution issues and an increase in road density.

13.3.2 Effects to Groundfish EFH

No effects to Groundfish EFH.

13.3.3 Effects to Coastal Pelagic Species EFH

No effects to Coastal Pelagic Species EFH.

14.0 ANALYSIS OF EFFECTS TO SPECIES OF CONCERN

USFWS, WDFW, and WNHP were contacted regarding the occurrence of federal species of concern in the project area. USFWS identified 18 species of concern that could potentially occur within the project area, including Pacific lamprey *(Lampetra tridentata)*, river lamprey *(Lampetra ayresi)*, California wolverine *(Gulo gulo luteus)*, Pacific fisher *(Martes pennanti pacifica)*, Pacific Townsend's big-eared bat *(Corynorhinus townsendii townsendii)*, long-eared myotis *(Myotis evotis)*, long-legged myotis *(Myotis volans)*, peregrine falcon *(Falco peregrinus)*, northern goshawk *(Accipiter gentilis),* olive-sided flycatcher *(Contopus cooperi),* northwestern pond turtle *(Clemmys marmorata marmorata),* tailed frog *(Ascaphus truei),* Cascades frog *(Rana cascadae),* western toad *(Bufo boreas),* Beller's ground beetle *(Agonum belleri),* Hatch's click beetle *(Eanus hatchi),* valley silverspot *(Speyeria zerene bremeri),* and white-top aster *(Aster curtus).* Table 9 summarizes the effects of the proposed project on these species.

14.1 FISH SPECIES

Two fish species of concern may be present within or near the project area: the Pacific lamprey and the river lamprey.

14.1.1 Distribution

River and Pacific lamprey range from Alaska to California in river and large inland streams. Like salmon, lamprey are anadromous with a similar life pattern. Adults spawn in gravel and sand nests of rivers and streams. Juvenile lamprey spend several years in the fresh water habitat, buried in sand and silt, filter-feeding. As maturing adults, they migrate to the ocean where they spend several years feeding as scavengers and parasites on other fish species, until they return to fresh water to spawn. After spawning, they die.

14.1.2 Status

The river and Pacific lamprey are declining in numbers throughout their range from the same human and natural impacts that salmonids face. Human impacts such as altering or reducing habitat, introducing exotic species, and increased pollution of aquatic systems have contributed to their decline. Since lampreys are dependent on fine sediments for filter feeding and cover during their juvenile life-stage, they are more susceptible to some pollutants than salmonids.

14.1.3 Presence in Project Area

Issaquah Creek within the project action area offers suitable habitat for the river and Pacific lamprey. The north tributary may offer juvenile rearing habitat areas of silt and sand, but there is no suitable spawning habitat. The juveniles may have a difficult time reaching suitable rearing areas in the north tributary from the mainstem of Issaquah Creek.

14.1.4 Determination of Effect

The proposed project will remove a small amount of riparian vegetation near the north tributary. This vegetation removal should not adversely affect lamprey populations due to the small amount of vegetation removed and since existing individuals can utilize remaining habitat within a few feet of the disturbed area. Also, no in-water work will occur, so there will be no direct mechanical injury or habitat disturbance. Felling riparian vegetation in the stream channel for a source of large woody debris and treatment of stormwater flows will maintain habitat conditions for lamprey within the action area. Pacific and river lamprey will not be adversely affected by the project.

Table 9. Impacts to Federal Species of Concern

Common Name	Scientific Name	Presence in Action Area	Effects Determination	Justification
		Fish Species		
River lamprey	*Lampetra ayresi*	Present	May adversely affect	Potential for sediments and contaminants entering water
Pacific lamprey	*Lampetra tridentata*	Present	May adversely affect	Potential for sediments and contaminants entering water
		Bird Species		
Peregrine falcon	*Falco peregrinus*	Unlikely	No effect	No suitable habitat present
Northern goshawk	*Accipiter gentilis*	Unlikely	May adversely affect	Marginal suitable habitat will be removed
Olive-sided flycatcher	*Contopus cooperi*	Likely Present	May adversely affect	Suitable habitat will be removed
		Terrestrial Mammal Species		
California wolverine	*Gulo gulo luteus*	Not Present	No effect	No suitable habitat present
Pacific fisher	*Martes pennanti pacifica*	Not Present	No effect	Species not documented in area.
Pacific Townsend's western big-eared bat	*Corynorhinus townsendii townsendii*	May be present	May adversely affect	Suitable habitat will be removed, increased disturbance.
		Bat Species		
Long-Eared Myotis	*Myotis evotis*	May be present	May adversely affect	Suitable habitat will be removed, increased disturbance.
Long-legged myotis	*Myotis volans*	May be present	May adversely affect	Suitable habitat will be removed, increased disturbance.
		Reptile and Amphibian Species		
Tailed frog	*Ascaphus truei*	May be present	May adversely effect	Removal of riparian vegetation may increase water temperature
Western toad	*Bufo boreas*	May be present	May adversely affect	Suitable habitat will be removed
Cascades frog	*Rana cascadae*	Not Present	No effect	Species not documented in area
Northwestern pond turtle	*Clemmys marmorata marmorata*	Not Present	No effect	Species not documented in area. Only marginal habitat present
		Insect Species		
Beller's ground beetle	*Agonum belleri*	Unlikely	No Effect	Suitable habitat not present
Hatch's click beetle	*Eanus hatchi*	Unlikely	No Effect	Suitable habitat not present
Valley silverspot	*Speyeria zerene bremeri*	Unlikely	No Effect	Suitable habitat not present
		Plant Species		
White-top aster	*Aster curtus*	Not Present	No Effect	Suitable habitat not present

14.2 Bat Species

The proposed project may occur within the territories of the long-legged myotis, the long-eared myotis and the Pacific Townsend's big-eared bat, which are federal species of concern. Each of these species is found throughout the state of Washington.

14.2.1 Distribution

All three bat species are generally found throughout the western half of the North American continent from Canada to Mexico (Cassidy et al, 1997). They are associated with conifer forests and arid regions with riparian forests. These species will roost in abandoned buildings, caves, mines, and bridges. These species generally breed in the fall and give birth during the summer. During the winter months, they usually migrate to warmer climates. They eat a variety of insects, with the bulk of the diet being moths.

14.2.2 Status

Historically, the Issaquah area was forested and was most likely populated with all three bat species. The area is now developed housing and infrastructure, and therefore, is unlikely to provide sufficient amounts of roosting and foraging habitat for these species. The myotis species have moderate tolerance for disturbance and some development, but the Pacific Townsend's big-eared bat may be more sensitive to disturbance, especially where maternal roost sites such as caves exist (Cassidy et al, 1997).

14.2.3 Presence in Project Area

There are no documented occurrences of Pacific Townsend's big-eared bat, long-eared myotis, or the long-legged myotis in the project area, and none were identified during field reconnaissance. There are few suitable roosting sites within the vicinity of the project, since caves and abandoned buildings do not exist in the project area. A large area of Douglas-fir trees may provide suitable roosting habitat. However, since human use of the area is high, it is very unlikely that these species of bats are present in great numbers.

14.2.4 Determination of Effect

If bats are present in the project area either in the area of Douglas-fir forest or in an undocumented cave or building that will be removed or disturbed by the project, the three bat species may be adversely affected. Adverse effects will include direct habitat removal as well as increased disturbance.

14.3 Amphibian and Reptile Species

Four amphibian and reptile species of concern may be present within or near the project area: the tailed frog, the Western toad, the Cascades frog, and the Northwestern pond turtle.

14.3.1 Distribution

The tailed frog and the Cascades frog are generally found in high elevation areas with clear, cold streams. The tailed frog requires cobble substrate in streams. The Northwestern pond turtle prefers slow moving rivers or other open water with large rocks or logs for basking. The Western toad generally inhabits a wide variety of upland areas but also requires slow moving streams or ponds to breed in (Pacific Biodiversity Institute, 2002).

14.3.2 Status

Filling of wetlands, removal of nearby upland habitat, general urbanization, and degradation of water quality are responsible for declines in many species of amphibians and reptiles, including the four listed here. All four species probably existed in the project area in the past.

14.3.3 Presence in Project Area

The tailed frog and Cascades frog are generally found at higher elevations than the project area (Cassidy et al, 1997), however a tailed frog sighting was made within 1.6 km (1 mi) of the project area. The Cascades frog is unlikely to be present in or near the project area. Suitable habitat for the Northwestern pond turtle, including slow moving rivers or other areas of open water with large rocks for basking, is lacking within the project area; therefore, it is unlikely they will exist there. Extensive surveys in the Puget Sound region suggest that the Northwestern pond turtle has been extirpated from the region (Cassidy et al, 1997). There are several records of Western toads in the Lake Washington area, and it should be assumed that they exist within the project area.

14.3.4 Determination of Effect

Construction of the road will add a migration barrier that could prevent toads from reaching their historical habitats. The proposed project will also remove a large amount of Douglas-fir forest that could provide habitat for the Western toad; thus having an adverse effect. Stream shading on the north tributary could be slightly reduced, leading to warmer water temperatures in Issaquah Creek. This will be an adverse affect to the tailed frog if any are present in Issaquah Creek. Because it is unlikely that the Cascades frog and the Northwestern pond turtle exist in the project area, the project will have no effect on them.

14.4 Bird Species

Three bird species of concern may be present within or near the project area: the Peregrine falcon, the Northern goshawk, and the olive-sided flycatcher.

14.4.1 Distribution

The Peregrine falcon prefers areas with large cliffs for nesting and perching. The Northern goshawk is found in mature coniferous forests. The olive-sided flycatcher is found in many forest types that have either natural or manmade openings such as wetlands or clear cuts (Pacific Biodiversity Institute, 2002).

14.4.2 Status

The Peregrine falcon population is rebounding after being depressed by the effects of the pesticide DDT before 1979. The Northern goshawk populations have declined with the loss of mature coniferous forests from logging and development. The olive-sided flycatcher requires edge habitat, preferably with mature forests nearby, and populations have also been reduced by the loss of mature forests (Pacific Biodiversity Institute, 2002).

14.4.3 Presence in Project Area

No large cliffs suitable for Peregrine falcon nesting or perching exist within or near the project area; therefore, they are unlikely to be present. Occasional migrants or foragers may be present at limited times. Northern goshawks are unlikely to be present since few mature coniferous forests are present; however, they may be occasional visitors to the Douglas-fir forest within the project area. The olive-sided flycatcher is most likely present, since good edge habitat exists between the Douglas-fir forest and the wetlands and school facilities (Cassidy et al, 1997).

14.4.4 Determination of Effect

Elimination of the Douglas-fir forest will reduce the available habitat for the Northern goshawk and the olive-sided flycatcher; thus having an adverse effect. No habitat for the Peregrine falcon will be disturbed, so the project will have no effect on it.

14.5 Mammal Species

Two mammal species of concern may be present within or near the project area: the California wolverine and the Pacific fisher.

14.5.1 Distribution

The Pacific fisher is generally found in dense, mature forests. Snags and downed logs are preferable for den sites. They are generally found at lower elevations without significant snow cover. The California wolverine has always been rare, due to its huge range and is found from alpine areas down to the edge of forested areas. Some sightings have been made in central Washington shrub-steppe where they are known to disperse long distances from the Cascades to other suitable habitats (Pacific Biodiversity Institute, 2002).

14.5.2 Status

The California wolverine is recovering from near or total extirpation in Washington and sightings are rare. The Pacific fisher is also rare and numbers may be declining. Most recent records show them at higher elevations than previously recorded, reflecting the loss of mature forests in the lowland areas (Cassidy et al, 2002).

14.5.3 Presence in Project Area

The Pacific fisher is probably absent from most of its former range in the Puget trough. The California Wolverine is not present in the project area.

14.5.4 Determination of Effect

Since the California wolverine is not present within the project area, the project will have no effect upon it. The loss of the Douglas-fir forest could adversely affect the Pacific fisher should any be present, but their presence is unlikely.

14.6 INSECT SPECIES

Three insect species of concern may be present within or near the project area: the Beller's ground beetle, the Hatch's click beetle, and the valley silverspot butterfly.

14.6.1 Distribution

The two beetle species are found exclusively in bog habitats, often near the edge of lakes or ponds. The valley silverspot butterfly prefers open native grassland meadows. All three species were once found throughout the Puget trough area (Pacific Biodiversity Institute, 2002).

14.6.2 Status

The Beller's ground beetle is known from only one bog area in King County, while the Hatch's click beetle is known from only a few remnant bog areas. Both beetle species have suffered severe loss of bog and wetland habitat from urban development, agriculture, and wetland draining. The valley silverspot butterfly has suffered severe loss of native grassland habitat from conversion to agriculture, urban development, and other human disturbances.

14.6.3 Presence in Project Area

There are no known occurrences of the three insect species of concern within or near the project area. There are no bog habitats or native grassland habitats present within or near the project area.

14.6.4 Determination of Effect

Since suitable habitat for the three insect species of concern is not present within or near the project area, and there are no documented occurrences of the species, the proposed project will have no effect on the Beller's ground beetle, the Hatch's click beetle, or the valley silverspot butterfly.

14.7 PLANT SPECIES

One plant species of concern may be present within or near the project area: the white-top aster.

14.7.1 Distribution

The white-top aster is found in the Puget trough lowlands in relatively flat, open, grassland areas, often bordered by Douglas fir and Oregon white oak. There is only one documented occurrence of the white aster in King County (Washington State Department of Natural Resources, 2002).

14.7.2 Status

There are only a few widely scattered areas where white-top aster occurs. Urbanization, agriculture, or other development has disturbed many areas of former habitat. Remaining areas are under threat from development, agriculture, or invasion by Scot's broom and Douglas fir.

14.7.3 Presence in Project Area

There are no known occurrences of the white-top aster within or near the project area. There are no grasslands present within or near the project area.

14.7.4 Determination of Effect

Since suitable habitat for the white-top aster is not present within or near the project area, and there are no documented occurrences of the species, the proposed project will have no effect on the white-top aster.

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15.0 REFERENCES

Beaman, B, October 1, 2003. Personal communication (teleconference with the Southeast Issaquah Bypass Project EIS team). Icicle Creek Engineers, Inc. Issaquah, Washington.

Cassidy, K.M., C.E. Grue, M.R. Smith, and K.M. Dvornich, eds. 1997. Washington State Gap Analysis- Final Report. Washington Cooperative Fish and Wildlife Research Unit, University of Washington, Vols. 1-5.

GeoEngineers, Inc. 1992. Report, Geotechnical Services, I-90 Interchange and Southeast Bypass Feasibility Study, Issaquah, Washington, prepared for the City of Issaquah.

Golder Associates, Inc. 1993. Lower Issaquah Valley Wellhead Protection Plan. Prepared for the Sammamish Plateau Water and Sewer District and the City of Issaquah, King County, Washington.

Grubb, T.G. 1976. A Survey and Analysis of Bald Eagle Nesting in Western Washington. Masters Thesis. University of Washington, Seattle, Washington.

Healey, M. C. 1998. Life History of Chinook Salmon. In: Pacific Salmon Life Histories. C. Groot and L. Margolis, editors. University of British Columbia Press: Vancouver, BC.

Herrera Environmental Consultants, Inc., 2003. Preliminary Evaluation of Infiltration Pond Performance. Technical memorandum prepared for Parsons Brinckerhoff by Mark Ewbank and Matt Brennan, Herrera Environmental Consultants, Inc., Seattle, Washington

Herrera and Associates 1998a. Streams and Fisheries Technical Report. Southeast Issaquah Bypass Environmental Impact Statement. Herrera and Associates Environmental Consultants, Seattle, Washington.

Herrera and Associates 1998b. Biological Resources Technical Report. Southeast Issaquah Bypass Environmental Impact Statement. Herrera and Associates Environmental Consultants, Seattle, Washington.

HDR 2002. Letter from Ed Murray with preliminary environmental information on the Park Pointe site, December 6 2002 HDR Engineering, Inc., Bellevue, Washington.

Issaquah, City of 1996d. Ordinance 2108, Land Use Code, Chapter 10.2, Critical Areas Regulations.

Interior Columbia Basin Ecosystem Management Project (ICBEMP). May 1997. Eastside Draft Environmental Impact Statement. Prepared for public lands managed by the U.S. Department of Agriculture, Forest Service and U.S. Department of the Interior, Bureau of Land Management. Walla Walla, Washington.

Jennings, Hugh 1998. Personal communication (e-mail regarding Christmas bird counts, received by Kathleen Adams, Herrera Environmental Consultants, Inc., May 13 1998). East Lake Washington Audubon Society, Bellevue, Washington.

Johnson, David H., and Thomas A. O'Neil, Managing Directors. 2001. Wildlife-Habitat Relationships in Oregon and Washington. Oregon State University Press: Corvallis, Oregon.

King County 2002. Fish distribution maps. http://dnr.metrokc.gov/wrias/8/fish-maps/coho/

King County 1998. King County Surface Water Design Manual. King County Department of Natural Resources, Water and Land Resources Division, Seattle, Washington.

King County 1991. Issaquah Creek Basin Current and Future Conditions and Source Identification Report, King County Surface Water Management Division, Seattle , Washington.

King County 1990. Sensitive Areas Map Folio. Department of Parks, Planning and Resources, Seattle, Washington.

Metro 1995. Lake Sammamish Total Phosphorus Model. King County Department of Metropolitan Services and King County Surface Water Management Division, July 1995, Seattle, Washington.

Myers, J.M., R.G. Kope, G.J. Bryant, D. Teel, L.J. Lierheimer, T.C. Wainwright, W.S. Grand, F.W. Waknitz, K. Neely, S.T. Lindley, and R.S. Waples. 1998. Status review of chinook salmon from Washington, Idaho, Oregon, and California. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-35, 443 p.

National Archives and Records Administration 1998. 1998 Federal Register(Volumes 63 and 64)

NOAA Fisheries 2002a. NOAA Fisheries announces findings on a delisting petition and two listing petitions, concerning a total of 16 Evolutionarily Significant Units (ESUs) of Pacific salmon and steelhead. (October 4 2002).
URL: < http://www.nwr.noaa.gov/reference/frn/2002/67FR48601.pdf >.

NOAA Fisheries 2002a. NOAA Fisheries Endangered Species Act Status Reviews and Listing Information Website. http://www.nwr.noaa.gov/1salmon/salmesa/index.htm

NOAA Fisheries 1996. Making Endangered Species Act determinations of effect for individual or grouped actions at the watershed scale. Environmental and Technical Services Division, Habitat Conservation Branch.

Negri, Steve 1998. Personal communication (telephone conversation with Kathleen Adams, Herrera Environmental Consultants, Inc.), Washington Department of Fish and Wildlife, Mill Creek, Washington.

Pacific Biodiversity Institute 2002. Websites visited:
http://www.pacificbio.org/ESIN/OtherInvertebrates/BellerGroundBeetle/BellerGroundBeetle_pg.html
http://www.pacificbio.org/ESIN/OtherInvertebrates/HatchClickBeetle/HatchClickBeetle_pg.html
http://www.pacificbio.org/ESIN/Mammals/PacificFisher/fisher_page.htm
http://www.pacificbio.org/ESIN/ReptilesAmphibians/TailedFrog/TailedFrogpg.html
http://www.pacificbio.org/ESIN/ReptilesAmphibians/WesternToad/westerntoad_pg.htm
http://www.pacificbio.org/ESIN/ReptilesAmphibians/WesternPondTurtle/WesternPondTurtlepg.html
http://www.pacificbio.org/ESIN/Birds/AmerPeregrineFalcon/americanpfalconpg.html
http://www.pacificbio.org/ESIN/Birds/BaldEagle/baldeaglepg.html

Pacific Fisheries Management Council (PFMC). 1999. Amendment 14 To The Pacific Coast Salmon Plan Appendix A: Description and Identification of Essential Fish Habitat, Adverse Impacts and Recommended Conservation Measures for Salmon. Portland, Oregon.

Parametrix 2002. Existing Conditions Report and Habitat Evaluation for City of Issaquah. Review Draft. Parametrix, Kirkland, Washington.

Peterson, A. 1986. Habitat Suitability Index Models: Bald Eagle (Wintering Season). U.S. Fish and Wildlife Service: Washington, DC.

Rieman, Bruce E., and John D. McIntyre. 1993. Demographic and Habitat Requirements for Conservation of Bull Trout. In: U.S. Department of Agriculture Forest Service, Intermountain Forest and Range Experiment Station. General Technical Report INT-302.

Rodrick, Elizabeth, and Milner, Ruth, technical editors. 1991. Management Recommendations for Washington's Priority Habitats and Species. Washington Department of Wildlife. Olympia, Washington.

Seattle-King County Health Department and Issaquah Creek Valley Ground Water Action Committee 1996. Issaquah Creek Valley Ground Water Management Plan (Draft). Issaquah, Washington.

Stalmaster, M.V. and J.R. Newman. 1979. Perch Site Preferences of Wintering Bald Eagles in Northwest Washington. Journal of Wildlife Management 43:221-224.

Stalmaster, M.V., and J.R. Newman. 1978. Behavioral Response of Wintering Bald Eagles to Human Activity. Journal of Wildlife Management 42:506-513.

Stinson, D. W., J.W. Watson, and K.R. McAllister. 2001. Draft Washington State Status Report for the Bald Eagle. Washington Department of Fish and Wildlife: Olympia, Washington. 90 pp.

U.S. Fish and Wildlife Service 1998, Fact Sheet: Bull Trout Facts Portland, OR. 2pp.

U.S. Fish and Wildlife Service. 1986. Pacific Bald Eagle Recovery Plan. U.S. Fish and Wildlife Service: Portland, Oregon.

Washington Natural Heritage Program 2002. Online Field Guide to Selected Rare Plants http://www.wa.gov/dnr/htdocs/fr/nhp/refdesk/fguide/htm/fsp_ascu.htm

Washington State Department of Ecology. 1998. 303(d) List of Impaired Waterbodies 1998 List by WRIA's. http://www.ecy.wa.gov/programs/wq/303d/1998/wrias/wria8.pdf

Washington State Department of Fish and Wildlife 1997a. Washington State salmonid stock inventory: Bull Trout/Dolly Varden. Olympia, Washington.

Weitkamp, L.A., Wainwright, T.C., Bryant, G.J., Milner, G.B., Teel, D.J., Kope, R.G., and Waples, R.S. 1995. Status Review of Coho Salmon from Washington, Oregon and California. U.S. Department of Commerce, NOAA Tech, Memo. NMFS-NWFSC-24

Young, John. 1997. Mammals of West Tiger Mountain/Tradition Plateau Natural Resources Conservation Area. Prepared for Washington State Department of Natural Resources, by Wilderness Awareness School, Duvall, Washington.